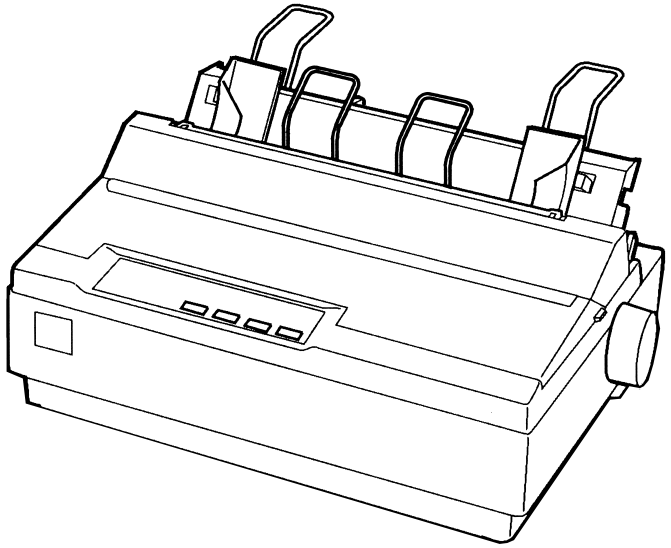
SERVICE MANUAL



24 Pins Serial Impact Dot Matrix Printer

LQ-300+/LQ-305K

COLOR IMAGING EPSON

EPSON®

SEDM00006

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Imaging & Information Product Division
TPCS Quality Assurance Center
TPCS Department

PRECAUTIONS

Precautionary notations throughout the text are categorized relative to 1)Personal injury and 2) damage to equipment.

DANGER Signals a precaution which, if ignored, could result in serious or fatal personal injury. Great caution should be exercised in performing procedures preceded by DANGER Headings.

WARNING Signals a precaution which, if ignored, could result in damage to equipment.

The precautionary measures itemized below should always be observed when performing repair/maintenance procedures.

DANGER

1. ALWAYS DISCONNECT THE PRODUCT FROM THE POWER SOURCE AND PERIPHERAL DEVICES PERFORMING ANY MAINTENANCE OR REPAIR PROCEDURES.
2. NO WORK SHOULD BE PERFORMED ON THE UNIT BY PERSONS UNFAMILIAR WITH BASIC SAFETY MEASURES AS DICTATED FOR ALL ELECTRONICS TECHNICIANS IN THEIR LINE OF WORK.
3. WHEN PERFORMING TESTING AS DICTATED WITHIN THIS MANUAL, DO NOT CONNECT THE UNIT TO A POWER SOURCE UNTIL INSTRUCTED TO DO SO. WHEN THE POWER SUPPLY CABLE MUST BE CONNECTED, USE EXTREME CAUTION IN WORKING ON POWER SUPPLY AND OTHER ELECTRONIC COMPONENTS.
4. WHEN DISASSEMBLING OR ASSEMBLING A PRODUCT, MAKE SURE TO WEAR GLOVES TO AVOID INJURIER FROM METAL PARTS WITH SHARP EDGES.

WARNING

1. REPAIRS ON EPSON PRODUCT SHOULD BE PERFORMED ONLY BY AN EPSON CERTIFIED REPAIR TECHNICIAN.
2. MAKE CERTAIN THAT THE SOURCE VOLTAGES IS THE SAME AS THE RATED VOLTAGE, LISTED ON THE SERIAL NUMBER/RATING PLATE. IF THE EPSON PRODUCT HAS A PRIMARY AC RATING DIFFERENT FROM AVAILABLE POWER SOURCE, DO NOT CONNECT IT TO THE POWER SOURCE.
3. ALWAYS VERIFY THAT THE EPSON PRODUCT HAS BEEN DISCONNECTED FROM THE POWER SOURCE BEFORE REMOVING OR REPLACING PRINTED CIRCUIT BOARDS AND/OR INDIVIDUAL CHIPS.
4. IN ORDER TO PROTECT SENSITIVE MICROPROCESSORS AND CIRCUITRY, USE STATIC DISCHARGE EQUIPMENT, SUCH AS ANTI-STATIC WRIST STRAPS, WHEN ACCESSING INTERNAL COMPONENTS.
5. DO NOT REPLACE IMPERFECTLY FUNCTIONING COMPONENTS WITH COMPONENTS WHICH ARE NOT MANUFACTURED BY EPSON. IF SECOND SOURCE IC OR OTHER COMPONENTS WHICH HAVE NOT BEEN APPROVED ARE USED, THEY COULD CAUSE DAMAGE TO THE EPSON PRODUCT, OR COULD VOID THE WARRANTY OFFERED BY EPSON.

About This Manual

This manual describes basic functions, theory of electrical and mechanical operations, maintenance and repair procedures of the printer. The instructions and procedures included herein are intended for the experienced repair technicians, and attention should be given to the precautions on the preceding page.

Manual Configuration

This manual consists of six chapters and Appendix.

CHAPTER 1. PRODUCT DESCRIPTIONS
Provides a general overview and specifications of the product.

CHAPTER 2. OPERATING PRINCIPLES
Describes the theory of electrical and mechanical operations of the product.

CHAPTER 3. TROUBLESHOOTING
Describes the step-by-step procedures for the troubleshooting.

CHAPTER 4. DISASSEMBLY / ASSEMBLY
Describes the step-by-step procedures for disassembling and assembling the product.

CHAPTER 5. ADJUSTMENT
Provides Epson-approved methods for adjustment.

CHAPTER 6. MAINTENANCE
Provides preventive maintenance procedures and the lists of Epson-approved lubricants and adhesives required for servicing the product.

APPENDIX Provides the following additional information for reference:

- Connector pin assignments
- Electric circuit boards components layout
- Electrical circuit boards schematics
- Exploded diagram & Parts List

Symbols Used in this Manual

Various symbols are used throughout this manual either to provide additional information on a specific topic or to warn of possible danger present during a procedure or an action. Be aware of all symbols when they are used, and always read NOTE, CAUTION, or WARNING messages.

Indicates an operating or maintenance procedure, practice or condition that is necessary to keep the product's quality.

Indicates an operating or maintenance procedure, practice, or condition that, if not strictly observed, could result in damage to, or destruction of, equipment.

May indicate an operating or maintenance procedure, practice or condition that is necessary to accomplish a task efficiently. It may also provide additional information that is related to a specific subject, or comment on the results achieved through a previous action.

I.ndicates an operating or maintenance procedure, practice or condition that, if not strictly observed, could result in injury or loss of life.

Revision Status

Revision	Issued Date	Description
A	January 25, 2001	First Release
B	February 15, 2001	Revision: • page -34 Table 2-3 “CR Motor Specifications” misdescription corrected. • page -39 Table 2-10 “PF Motor Specifications” misdescription corrected. • page -42-“C395 MAIN Block Diagram” added. • page -43 Table 2-14 “Main ICs and Functions” misdescription corrected. • page -93-“Component Layout-C395MAIN (Mounted Side)” added. • page -94-“Component Layout-C395MAIN (Soldered Side)” added. • page -87 Table 7-14 “LQ-300+ Parts List” added.
C	October 28, 2003	Revision: [Chapter-1] The description about “LQ-305K” is added. page -29-“Difference between LQ-300+ and LQ-305K”

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CHAPTER

1

PRODUCT DESCRIPTION

1.1 Features

EPSON LQ-300+ is a 24-pin serial impact dot matrix printer. The major features of this printer are as follows:

- ☐ Printing speed:
  - High speed draft: 300 cps at 10 cpi
  - Draft: 225 cps at 10 cpi
  - NLQ: 75 cps at 10 cpi
- ☐ Feeding method:
  - Friction feed (rear)
  - Push tractor feed (rear)
  - Push and Pull tractor feed (rear)
  - Pull tractor feed (rear, bottom)
- ☐ Feeder: Rear push tractor, CSF single-bin (Option), Pull tractor (Option) and Roll paper holder (Option)
- ☐ Paper/ Media: Single sheet, Continuous paper, Multi part paper, Envelope, Label and Roll paper
- ☐ Fonts: 9NLQ and 1 Draft Bitmap and 4 Scalable typefaces, 8 Barcode fonts
- ☐ Character tables:
  - Standard version: 13 tables
  - NLSP version: 39 tables
- ☐ Input buffer: 32 Kbytes
- ☐ Acoustic noise: 49 dB(A) (ISO 7779 pattern)
- ☐ Reliability:
  - Mean print volume between failure (MVBF)(MTBF 25% duty cycle): 12 million lines (except printhead)
  - MTBF: 6000 POH (25% Duty)
  - Printhead life: 200 million strokes/ wire (Black); 100 million strokes/ wire(Color)
  - Ribbon life: 2 million characters
- ☐ Interface: Bi-directional parallel interface (IEEE-1284 nibble mode supported), Serial I/F
- ☐ Control code: ESC/P and IBM 2390 Plus emulation
- ☐ Copy capability: 1 original + 3 copies
- ☐ Control panel functions: Font, Pause, Tear off, LF/FF, Load/ Eject, Micro Adjust, Self test, Data dump and the default settings

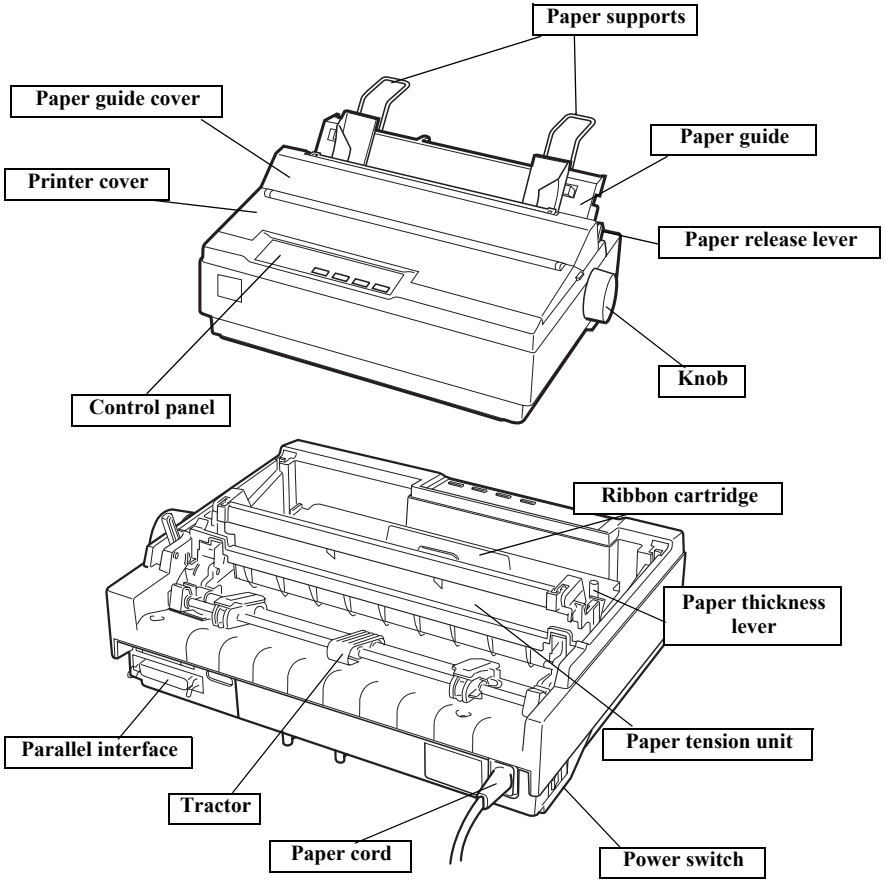


Figure 1-1. EPSON LQ-300+ Printer Parts

1.2 SPECIFICATIONS

1.2.1 Physical Specification

- Without Pull Tractor
  - Dimensions: 366 x 275 x 159 mm (WxDxH)
  - Mass: Approx. 4.4 kg
  - Appearance: See the figure below.

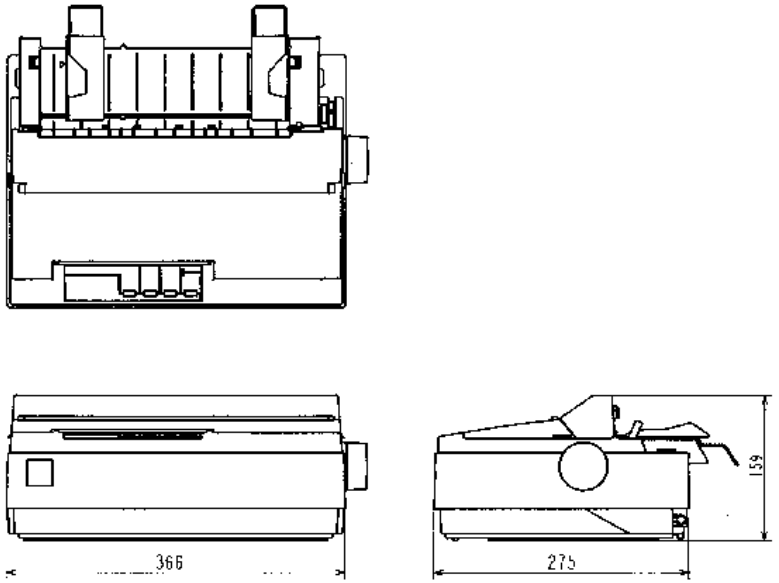


Figure 1-2. Appearance Without Pull Tractor

- With CSF (Single bin CSF)
  - Dimensions: 366 x 441 x 370 mm (WxDxH)
  - Mass: Approx. 4.6 kg
  - Appearance: See the figure below.

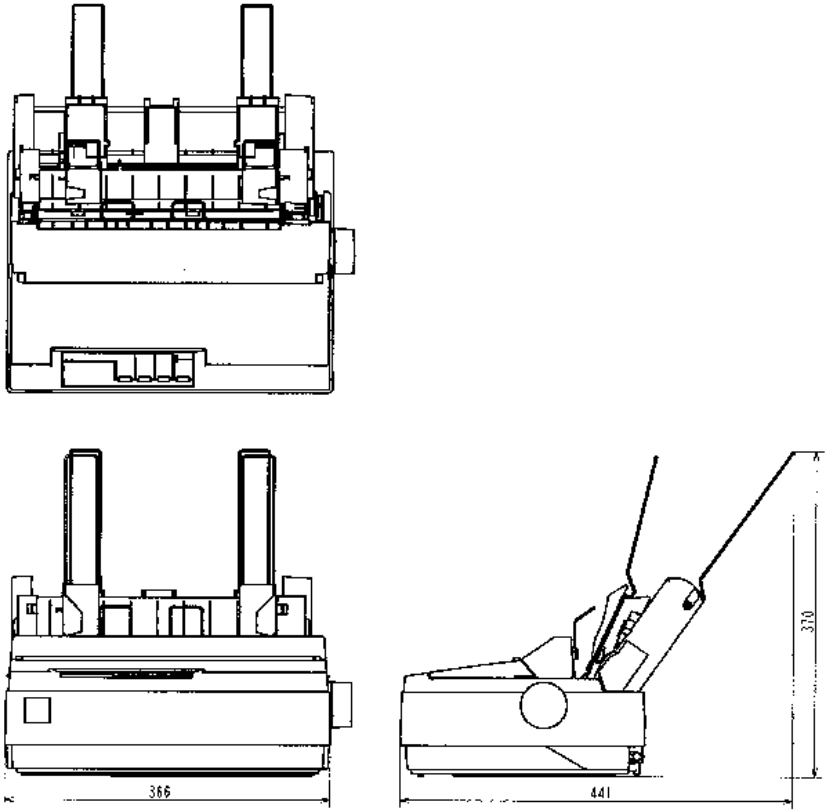


Figure 1-3. Appearance With CSF

1.2.2 Printing Specification

- ☐ Print method: Impact dot matrix
- ☐ Number of pins: 24 pins
- ☐ Print pin arrangement: 12 x 2 staggered
- ☐ Print pin diameter: 0.29 mm (0.0114 inch)
- ☐ Color (Option): Black, Magenta, Cyan, Yellow
- ☐ Print direction: Bi-direction with logic seeking
- ☐ Print speed and printable columns:

Printing mode	Character pitch (cpi)	Printable columns	Printing speed (cps)	
			Normal	Copy
High speed draft	10	80	300	266
Draft	10	80	325	200
	12	96	270	240
	15	120	337	300
Draft condensed	17	137	192	170
	20	160	225	200
LQ	10	80	75	66
	12	96	90	79
	15	120	112	99
LQ condensed	17	137	128	112
	20	160	150	132

NOTE: *When the power supply voltage drops to the lower limit, the printer stops printing and then starts printing the rest on the line more slowly than before.*

NOTE: *When the head temperature rises to the upper limit, the printer stops printing.*
When the head temperature falls to the normal level, the printer starts printing again and more slowly than before.

- ☐ Resolution:

Printing mode	Horizontal density (dpi)	Vertical density (dpi)	Adjacent dot print
High speed draft	90	180	No
Draft	120	180	No
Draft condensed	240	180	No
LQ	360	180	No
8 pin bit image	60, 80, 90 or 120	60	Yes
	120 or 240	60	No
24 pin bit image	60, 80, 90 or 120	180	Yes
	120 or 240	180	No
Raster graphics*1	180 or 360	180 or 360	Yes

*1: Not described in this manual.

- ☐ Control code: ESC/P 2 and IBM 2390 Plus emulation (Refer to 1.5 "Control codes")

- Character tables:
  - Standard version (13 character table)

Italic table	PC437 (US, Standard Europe)
PC850 (Multilingual)	PC860 (Portuguese)
PC863 (Canadian-French)	PC865 (Nordic)
PC861 (Icelandic)	BRASCII
Abicomp	Roman 8
ISO Latin 1	PC858
ISO 8859-15	

  - NLSP version (39 character tables)

Italic table	PC437 (US, Standard Europe)
PC850 (Multilingual)	PC437 Greek
PC853 (Turkish)	PC855 (Cyrillic)
PC852 (East Europe)	PC857 (Turkish)
PC864 (Arabic)	PC866 (Russian)
PC869 (Greek)	MAZOWIA (Poland)
Code MJK (CSFR)	ISO 8859-7 (Latin / Greek)
ISO Latin 1T (Turkish)	Bulgaria (Bulgarian)
PC 774 (LST 1283:1993)	Estonia (Estonia)
ISO 8859-2	PC 866 LAT. (Latvian)
PC 866 UKR (Ukrania)	PC860 (Portuguese)
PC 861 (Icelandic)	PC865 (Nordic)
PC APTEC (Arabic)	PC708 (Arabic)
PC 720 (Arabic)	PCAR864 (Arabic)
PC863 (Canadian-French)	Abicomp
BRASCII	Roman 8
ISO Latin 1	Hebrew 7*1
Hebrew 8*1	PC862 (Hebrew)*1
PC858	IAO8859-15
PC771 (Lithuania)	

NOTE:*1: This item is not displayed on a default setting mode. Not described in this manual.*

- International character sets: 14 countries and legal

U.S.A	France	Germany
U.K.	Denmark 1	Sweden
Italy	Spain 1	Japan
Norway	Denmark 2	Spain 2
Latin America	Korea	Legal

NOTE:*The international and legal characters are the following 12 codes; 23H, 24H, 40H, 5BH, 5CH, 5DH, 5EH, 60H, 7BH, 7CH, 7DH, 7EH.*

- Typeface
  - Bit map fonts:

EPSON Draft	10cpi, 12cpi, 15cpi
EPSON Roman	10cpi, 12cpi, 15cpi, Proportional
EPSON Sans serif	10cpi, 12cpi, 15cpi, Proportional
EPSON Courier	10cpi, 12cpi, 15cpi
EPSON Prestige	10cpi, 12cpi
EPSON Script	10cpi
EPSON OCR-B	10cpi
EPSON Orator	10cpi
EPSON Orator-S	10cpi
EPSON Script C	Proportional

- Bar codes

EAN-13	EAN-8	Interleaved 2 of 5
UPC-A	UPC-E	Code 39
Code 128	POSTNET	Coda bar (NW-7)*1
Industrial 2 of 5 *1	Matrix 2 of 5 *1	

NOTE: **1: Not described in this manual.*

☐ Character tables and typefaces:

	Character table	Bitmap font	Scalable font
Standard version	**Italic table** **PC 437 (US, Standard Europe)** **PC 850 (Multilingual)** **PC 860 (Portuguese)** **PC 863(Canadian-French)** **PC 865 (Nordic)** **PC 861 (Icelandic)** **Abicomp** **BRASCII** Roman 8 ISO Latin 1 PC 858 ISO 8859-15	EPSON Draft EPSON Roman EPSON Sans Serif EPSON Courier EPSON Prestige EPSON Script EPSON OCR-B EPSON Orator EPSON Orator-S EPSON Script C	EPSON Roman EPSON Sans Serif EPSON Roman T EPSON Sans Serif H
NLSP version	**Italic table** **PC 437 (US, Standard Europe)** **PC 850 (Multilingual)** **PC 860 (Portuguese)** **PC 863(Canadian-French)** **PC 865 (Nordic)** **PC 861 (Icelandic)** **Abicomp** **BRASCII** Roman 8 ISO Latin 1 PC 858 ISO 8859-15	EPSON Draft EPSON Roman EPSON Sans Serif EPSON Courier EPSON Prestige EPSON Script EPSON OCR-B EPSON Orator EPSON Orator-S EPSON Script C	EPSON Roman EPSON Sans Serif EPSON Roman T EPSON Sans Serif H
	PC 864(Arabic)	EPSON Draft EPSON Roman	Not supported
NLSP version	PC437 (Greek) PC852 (East Europe) PC853 (Turkish) PC 855 (Cyrillic) PC 857 (Turkish) PC 866 (Russian) PC 869 (Greek) MAZOWIA (Poland) Code MJK (CSFR) 1SO 8859-7 (Latin/Greek) lSO Latin 1T (Turkish) Bulgaria (Bulgarian) Estonia (Estonian) PC774 (LST 1283: 1993) ISO 8859-2 PC 866 LAT. (Latvian) PC 866 UKR (Ukrania) PC771 (Lithuania)	EPSON Draft EPSON Roman EPSON Sans Serif EPSON Courier EPSON Prestige EPSON Script	Not supported
	PCAPTEC (Arabic) PC708(Arabic) PC720(Arabic) PCAR 864 (Arabic)	EPSON Draft (Arabic) EPSON Roman EPSON San Serif	Not supported
	Hebrew7*1 Hebrew8*1 PC862(Hebrew)*1	EPSON Draft (Hebrew) EPSON Roman EPSON Courier	Not supported

NOTE: *ESC R command is effective on the character tables with bold.*

NOTE: **1: These items are not displayed in the default setting mode. Not described in this manual.*

1.2.3 Paper Feeding

- Feeding method: Friction feed (rear)
  Push tractor feed (rear)
  Push and Pull tractor feed (rear)
  Pull tractor feed (rear, bottom)
- Feeder: Rear push tractor, CSF single-bin (Option)
  Pull tractor (Option) and Roll paper holder (Option)
- Paper path:

Manual insertion	Rear in, top out
CSF	Rear in, top out
Push Tractor	Rear in, top out
Pull Tractor	Rear or bottom in, top out

- Line spacing: 4.23mm (1/6 inch) or programmable
  in increments of 0.0706mm (1/360 inch)
- Feed speed:

Normal mode	4.23mm (1/6 inch feed)	53msec
	Continuous feed	0.092MPS (m/sec.) [3.61 IPS (inch/sec.)]
Copy mode	4.23mm (1/6 inch feed)	106msec
	Continuous feed	0.042MPS (m/sec.) [1.67 IPS (inch/sec.)]

- Input Data Buffer: 32 Kbyte
- Release lever:
  The release lever must be set according to the following table below.

Lever position	Paper path/ Feeder	Paper/ Media
Friction	Manual insertion (rear)	Cut sheet (Single sheet and Multi part) Envelop
	CSF single-bin	Cut sheet (Single sheet)
	Roll paper holder feed (rear)	Roll paper
Tractor	Push tractor feed (rear)	Continuous paper (Single sheet & Multi part)
	Push and Pull tractor feed (rear)	Continuous paper (Single sheet & Multi part)
	Pull tractor feed (rear)	Continuous paper (Single sheet & Multi part)
	Pull tractor feed (bottom)	Continuous paper (Single sheet & Multi part) Labels

- Paper thickness lever:
  The paper thickness lever must be set at the proper position as shown below.

Lever position	Paper thickness (inch)	
	Minimum	Maximum
0	0.06(0.0024)	0.12(0.0047)
1	0.12(0.0047)	0.19(0.0075)
2	0.19(0.0075)	0.26(0.0102)
3	0.26(0.0102)	0.32(0.0126)
4	0.32(0.0126)	0.44(0.0173)
5	0.44(0.0173)	0.52(0.0205)

1.2.4 Electrical Specification

- 120 V version
  - Rated voltage: AC 120V
  - Input voltage range: AC 99 to 132 V
  - Rated frequency range: 50 to 60 Hz
  - Input frequency range: 49.5 to 60.5 Hz
  - Rated current: 0.6A (max. 1.4A)
  - Power consumption: approx. 20W (ISO/IEC 10561 Letter pattern)
  - Insulation resistance: 10MΩ min. (between AC line and chassis, DC500V)
  - Dielectric strength: AC 1000 Vrms. 1 min. or AC 1200 Vrms. 1 sec. (between AC line and chassis)
- 230 V version
  - Rated voltage range: AC 220 to 240 V
  - Input voltage range: AC 198 to 264 V
  - Rated frequency range: 50 to 60 Hz
  - Input frequency range: 49.5 to 60.5 Hz
  - Rated current: 0.3 A (max. 0.7A)
  - Power consumption: approx. 20W (ISO/IEC10561 Letter pattern)
  - Insulation resistance: 10MΩ min. (between AC line and chassis, DC 500V)
  - Dielectric strength: AC 1500 Vrms. 1 min. (between AC line and chassis)

1.2.5 Environmental Condition

- Temperature: 5 to 35 °C (operating*1)
  15 to 25 °C (operating*1,*2)
  -30 to 60 °C (non-operating)
- Humidity: 10 to 80% RH (operating*1)
  30 to 60% RH (operating*1,*2)
  0 to 85% RH (non-operating)
- Resistance to shock: 1 G, within 1ms (operating)
  2 G, within 2ms (non-operating*3)
- Resistance to vibration: 0.25 G, 10 to 55 Hz (operating)
  0.50 G, 10 to 55 Hz (non-operating*3)

**1: without condensation*
**2: during printing on multi part paper, envelop, card, or label*
**3: without shipment container*

1.2.6 Reliability

- Total print volume: 12 million lines (except printhead)
- MTBF: 6000 POH
- Printhead life: 200 million strokes / wire

1.2.7 Ribbon Cartridge

- Type: Fabric
  Color: Black
  Ribbon life: approx. 2 million characters (LQ 10 cpi, 48 dots/character)
- Type: Fabric
  Color: Black, Magenta, Cyan and Yellow
  Ribbon life:
  - Black: approx. 1 million characters (Draft 10 cpi, 48 dots/character)
  - Magenta: approx. 0.7 million characters (Draft 10 cpi, 48 dots/character)
  - Cyan: approx. 0.7 million characters (Draft 10 cpi, 48 dots/character)

- Yellow approx. 0.5 million characters (Draft 10 cpi, 48 dots/character)

☐ Type: Film
Color: Black
Ribbon life: approx. 0.2 million characters
(LQ 10 cpi, 48 dots/character)

1.2.8 Safety Approvals

☐ 120 V version

- Safety standards: UL1950
  CSA C22.2 No. 950
- EMI: FCC part15 subpart B class B
  CSA C108.8 class B

☐ 230 V version

- Safety standards: EN60950 (VDE)
- EMI: EN55022 (CISPR pub.22) class B
  AS/NZS 3548 class B

1.2.9 CE Marking

230 V version and UPS version

- Low voltage directive 73/23/EEC: EN60950
- EMC Directive 89/336/EEC: EN55022 class B
  EN61000-3-2
  EN61000-3-3
  EN55024

1.2.10 Acoustic noise:

Level: approx. 49 dB(A) (ISO 7779 pattern)

1.3 INTERFACE

LQ-300+ provides bi-directional 8-bit parallel interface and serial interface. Optional interface board is not supported on this model.

1.3.1 Parallel Interface (Forward Channel)

- ☐ Transmission mode: 8 bit parallel
  IEEE-1284 compatibility mode
- ☐ Adaptable connector: 57-30360 (Amphenol) or equivalent
- ☐ Synchronization: -STROBE pulse
- ☐ Handshaking: BUSY and -ACKLG signals
- ☐ Signal level: TTL compatible
  (IEEE-1284 level 1 device)

Parameter	Minimum	Maximum	Condition
V_{OH}*	--	5.5V	
V_{OL}*	-0.5V	--	
I_{OH}*	--	0.32mA	V_{OH}=2.4V
I_{OL}*	--	12mA	V_{OL}=2.4V
C_O	--	50pF	
V_{IH}	--	2.0V	
V_{IL}	0.8V	--	
I_{IH}	--	0.32mA	V_{IH}=2.0V
I_{IL}	--	12mA	V_{IL}=0.8V
C_I	--	50pF	

NOTE: ** Logic-H signal is 2.0V or lower when the printer is off and the signal is 3.0V or higher when the printer is on. The receiver has impedance which is equivalent to 7.5 kΩ.*

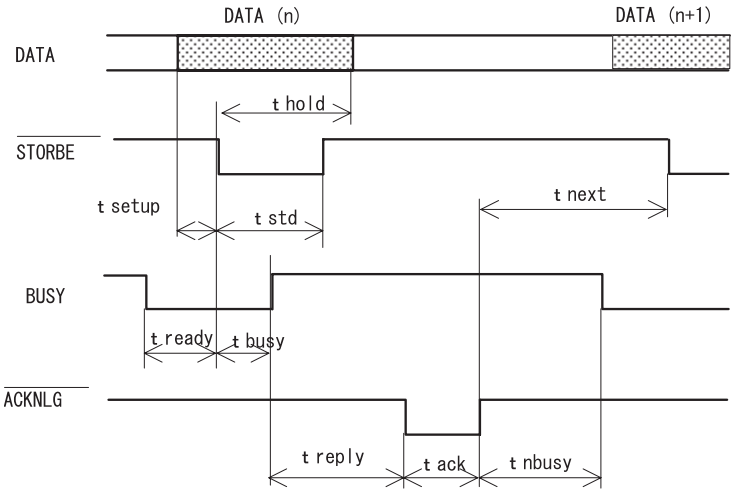


Figure 1-4. Data Transmitting Timing

Parameter	Minimum	Maximum
t_{setup}	500 nsec	--
t_{hold}	500 nsec	--
t_{stb}	500 nsec	--
t_{ready}	0	--
t_{busy}	--	500 nsec
t_{reply}	--	--
t_{ack}	500 nsec	10 us
t_{nbusy}	0	--
t_{next}	0	--
t_{tout}*	--	120 nsec
t_{tin}**	--	200 nsec

NOTE: ** Rise and fall time of output signals*
*** Rise and fall time of input signals.*

- BUSY signal is active (HIGH level) under the conditions below:
  - In the process of receiving data
  - In the condition of being input buffer full
  - In the condition of being -INT signal active (low level)
  - During hardware initialization
  - In the condition of being -ERROR or PE signal is active (low level, high level, respectively)
  - In the self test mode
  - In the adjustment mode
  - In the default-setting mode
- -ERROR signal is active (low level) under the conditions below:
  - In the condition of a paper-out error
  - In the condition of a release lever error
- PE signal is active (high level) under the condition below:
  - In the condition of a paper-out error

Table 1-1. Connector Pin Assignment and Signals

Pin No.	Signal Name	Return GND Pin	In/Out	Functional Description
1	-STROBE	19	In	Strobe pulse. Input data is latched at falling edge of the signal.
2	DATA1	20	In	Parallel input data to the printer. bit0:LSB
3	DATA2	21	In	bit1
4	DATA3	22	In	bit2
5	DATA4	23	In	bit3
6	DATA5	24	In	bit4
7	DATA6	25	In	bit5
8	DATA7	26	In	bit6
9	DATA8	27	In	bit7:MSB
10	-ACKNLG	28	Out	This signal (negative pulse) indicates that the printer has received data and is ready to accept next one.
11	BUSY	29	Out	This signal's high level means that the print is not ready to accept data.
12	PE	28	Out	This signal's high level means that the printer is in a state of paper-out error.
13	SLCT	28	Out	Always at high level when the printer is powered on.
14	-AFXT	30	In	Not used.
31	-INIT	30	In	This signal's negative pulse initializes printer.
32	-ERROR	29	Out	This signal's low level means the printer is in a state of error.
36	-SLIN	30	In	Not used.
18	Logic H	--	Out	This line is pulled up to +5V through 3.9 kΩ resister.
35	+5V	--	Out	This line is pulled up tp +5V through 1.0 kΩ resister.
17	Chassis	--	--	Chassis GND.
16, 33, 19-30	GND	--	--	Signal GND.
15, 34	NC	--	--	Not connected.

NOTE: *In/Out shows the direction of signal flow from the printer's point of view.*

1.3.2 Parallel Interface (Reverse Channel)

- Transmission mode: IEEE-1284 nibble mode
- Adaptable connector: See 1.3.1 "Parallel Interface (Forward Channel)"
- Synchronization: Refer to the IEEE-1284 specification
- Handshaking: Refer to the IEEE-1284 specification
- Signal level: IEEE-1284 level 1 device
  See 1.3.1 "Parallel Interface (Forward Channel)"
- Data transmission timing: Refer to the IEEE-1284 specification
- Extensibility request: The printer responds to the extensibility request affirmatively when the request is 00H or 004H;

  00H: Request for nibble mode of reverse channel transfer.
  04H: Request device ID in nibble mode of reverse channel transfer.
- Device ID: The printer sends the following device ID string when it is requested.

  - When IEEE1284.4 is enabled;

```
[00H][4DH]
MFG: EPSON;
CMD: ESCPL2,PRPXL24,BDC,D4;
MDL: LQ-300+;
CLS: PRINTER;
DES: EPSON[SP]LQ-300+;
```

  - When IEEE1284.4 is disabled;

```
[00H][50H]
MFG: EPSON;
CMD: ESCPL2,PRPXL24,BDC;
MDL: LQ-300+;
CLS: PRINTER;
DES: EPSON[SP]LQ-300+;
```

Pin No.	Signal Name	Return GND Pin	In/Out	Functional Description
1	HostClk	19	In	Host clock signal.
2	DATA1	20	In	Parallel input data to the printer. bit0:LSB
3	DATA2	21	In	bit1
4	DATA3	22	In	bit2
5	DATA4	23	In	bit3
6	DATA5	24	In	bit4
7	DATA6	25	In	bit5
8	DATA7	26	In	bit6
9	DATA8	27	In	bit7:MSB
10	PtrClk	28	Out	Printer clock signal.
11	PtrBusy/DataBit-3,7	29	Out	Printer busy signal and reverse channel transfer data bit 3 or 7.
12	AckDataReq/ DataBit-2,6	28	Out	Acknowledge data request signal and reverse channel transfer data bit 2 or 6.
13	Xflag/ DataBit-1,5	28	Out	X-flag signal and reverse channel transfer data bit 1 or 5.
14	HostBusy	30	In	Host busy signal.
31	-INIT	30	In	Not used.
32	-DataAvail/ DataBit-0,4	29	Out	Data available signal and reverse channel transfer data bit 0 or 4.
36	1284-Active	30	In	1284 active signal.
18	Logic-H	--	Out	This line is pulled up to +5V through 3.9 kΩ resister.
35	+5V	--	Out	This line is pulled up tp +5V through 1.0 kΩ resister.

Pin No.	Signal Name	Return GND Pin	In/Out	Functional Description
17	Chassis	--	--	Chassis GND.
16, 33, 19-30	GND	--	--	Signal GND.
15, 34	NC	--	--	Not connected.

NOTE: *In/Out shows the direction of signal flow from the printer's point of view.*

1.3.3 Serial Interface

- ☐ Synchronization: Asynchronous
- ☐ Signal level: EIA-232D
  MARK (logical 1): -3V to -25V
  SPACE (logical 0): +3V to +25V
- ☐ Word length: Start bit: 1 bit
  Data bit: 7 bit, 8 bit
  Parity bit: Odd, Even, Non, Ignore
  Stop bit: 1 bit or more
- ☐ Baud rate: 300, 600, 1200, 2400, 4800, 9600 or 19200 bps
- ☐ Handshaking: DTR signal and XON/XOFF
  DTR=MAEK, XOFF: indicates that the printer cannot receive data.
  DTR=MARK, XON: indicates that the printer is ready to receive data.

NOTE: *The DTR signal is MARK and XOFF code (DC3, 13H) is transmitted when the rest of the input buffer becomes 256 bytes. The DTR signal is SPACE and XON code (DC1, 11H) is transmitted when the rest of the input buffer is regained 256 byte.*

- ☐ Error handling: Parity error is only detected. Overrun error and framing error are ignored.
- ☐ Connector: 25 pin subminiature D-shell connector (female)

Pin No.	Signal Name	In/Out	Functional Description
2	TXD	Out	Transmit data.
20	DTR	Out	Indicates that the printer is ready to receive data or not.
11	REV	Out	Connected directly to the DTR signal.
4	RTS	Out	Request to send. Always SPACE level when the printer is powered on. Pulled up to +12V via 4.7KΩ resistor.
3	RXD	In	Receive data.
7	Signal GND	--	Signal GND
1	Chassis GND	--	Chassis GND
other	NC	--	Not used. Not connected.

NOTE: *In/Out shows the direction of signal flow from the printer's point of view.*

1.3.4 Interface Selection

The printer has 2 interfaces; the parallel interface and serial interface. These interfaces are selected manually by Default Setting or selected automatically.

- Manual Selection
  One of 2 interfaces can be selected by Default setting.
- Automatic Selection
  The automatic interface selection is enabled by Default Setting. In this automatic interface selection mode, the printer is initialized to the idle state scanning which interface receives data when it is powered on. Then the interface that receives data first is selected. When the host stops data transfer and the printer is in stand-by state for the seconds specified by Default Setting, the printer is returned to the idle state. As long as the host sends data or the printer interface is in busy state, the selected interface is let as it is.
- Interface State and Interface Selection
  When the parallel interface is not selected, the interface gets into a busy state. When the serial interface is not selected, the interface sends XOFF and sets the DTR signal MARK. When the printer is initialized or returned to the idle state, the parallel interface got into a ready state, the serial interface sends XON and sets the DTR SPACE. Caution that the interrupt signal such as a -INIT signal on the parallel interface is not effective while that interface is not selected.

1.3.5 Prevention Hosts from Data Transfer Time-out

Generally, hosts abandons data transfer to peripherals when a peripheral is in busy state for dozens of seconds continuously. To prevent hosts from this kind of time-out, the printer receives data very slowly, several bytes per minute, even if the printer is in busy state. This slowdown is started when the rest of the input buffer becomes several hundreds of bytes. At last, when the input buffer is full, the printer is in busy state continuously.

1.3.6 IEEE1284.4 protocol

The packet protocol described by IEEE1284.4 is supported on the parallel I/F.
Two function modes of IEEE1284.4 protocol, “Off” and “Auto” are available, and one of them is selected according to the value of Default setting. (See 1.4.2.3 "Default Setting")

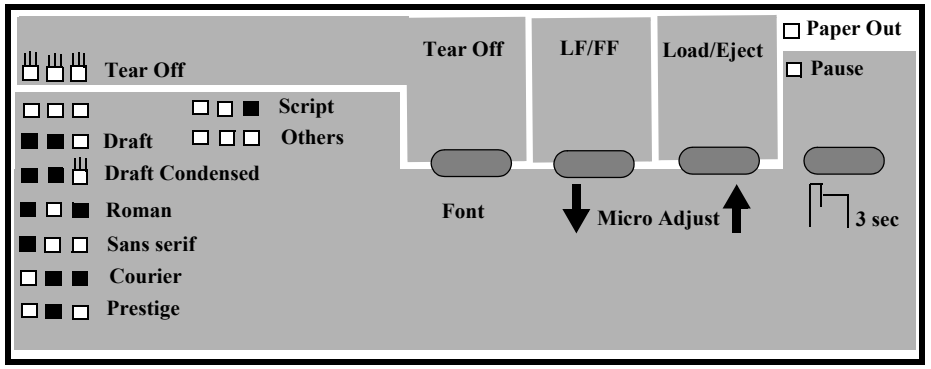
- Auto:
  Communication is carried out in the conventional mode until a magic string (1284.4 synchronous commands) is received. By receiving a magic string, communication in IEEE1284.4 packet mode is started.
- Off:
  Communication is carried out in the conventional mode. A magic string (1284.4 synchronous commands) is discarded.

NOTE: *The packet protocol of IEEE1284.4 allows a device to carry on multiple exchanges or conversations which contain data and/or control information with another device at the same time across a single point-to-point link.*
The protocol is not, however, a device control language. It does provide basic transport-level flow control and multiplexing services.
The multiplexed logical channels are independent of each and blocking of one has no effect on the others. The protocol operates over IEEE1284.

1.4 OPERATOR CONTROLS

1.4.1 Operation Switches

4 switches and 5 LEDs are on the panel as shown below.



□: LED On ▯ : LED Blinks ■: LED Off

Figure 1-5. Control Panel

1.4.1.1 Switches

□ Operation in normal mode
In normal mode, pressing panel switches executes the following functions.

Switch	Function
Pause	-Alternates printing and non-printing status. -Enables Micro Adjustment function and Font selection, holding it down for 3 seconds.
Load/Eject	-Loads or ejects paper. -Execute micro feed forward, when this function is enabled.
LF/FF	-Executes line feed, pressing it shortly. -Executes form feed, holding it down for a few seconds. -Executes micro feed backward, when this function is enabled.
Tear Off	-Advances continuous paper to the Tear-off position. -Select font, when this function is enabled.

□ Operation at power on
Turning the printer on while pressing panel switches executes the functions below;

Switch	Function
Load/Eject	LQ self test
LF/FF	Draft self test
Tear Off	Default setting
Load/Eject & LF/FF	Data dump
Load/Eject & LF/FF & Pause	Clear EEPROM
Tear Off & Load/Eject & LF/FF	Clear EEPROM for Diving Line count for ribbon change timing.
Pause	Bi-d adjustment
Others	Not available

☐ Operation in default setting mode
The following switches are used in default setting mode as follows;

Switch	Function
Tear Off	Selects the Menu.
LF/FF	Change the setting
Others	Not available.

1.4.1.2 LED

☐ Indication in normal mode

LED / Printer Status	Pause*1	Paper Out*2	Font
Pause	On	---	---
Paper out error	On	On	---
Release lever error	On	---	---
Paper eject warning	On	Blink	---
Micro Adjust	Blink	---	---
Head hot warning	Blink	---	---
Tear off	---	---	*3
Font selection	---	---	*3
Fatal error	Blink	Blink	Blink

*1 Pause (Orange)
-It is on when the printer is paused, and it is off when the printer is not paused.
-It blinks when Micro Adjust is enabled or the printer is in the head hot status.

*2 Paper Out (Red)
-It is on when the printer is in the Paper out status, and it is off when the printer is out of this status.

*3 Font (Green)
-3 LEDs indicate the status of Font selection when continuous paper is out of the Tear-off position.
-All LEDs blink when continuous paper is in the Tear-off position.
★★★: Tear off
■■□: Draft
■■★: Draft Condensed
■□■: Roman
■□□: Sans serif
□■■: Courier
□■□: Prestige
□□■: Script
□□□: Others
(□: LED On, ■: LED Off, ★: LED Blinks)

1.4.1.3 Buzzer

☐ Paper out error: Beeper sounds (...)*

☐ Release lever operation: Beeper sounds(-----)*

☐ Illegal panel operation: Beeper sounds (.)*

*The description (.) and (-) in the above shows how the beeper sounds.
(.): Beeper sounds approx. 100ms and interval is approx. 100ms.
(-): Beeper sounds approx. 500ms and interval is approx. 100ms.

1.4.2 Panel Functions

1.4.2.1 Usual Operation

- Pause
  -This switch alternates printer activity between printing and non-printing.
  -By holding it down for over 3 seconds when the printer is in the stand by state, the Micro Adjust function is enabled. By pressing it again, this function is disabled.
- Load/Eject
  -Pressing it loads out sheet or continuous paper when the printer is out of paper.
  -Pressing it ejects out sheet to the stacker or continuous paper to the paper park.
- LF/FF
  -Pressing it shortly executes line feed.
  -Holding it down for a few seconds executes form feed when continuous paper is used, or ejects cut sheet to the stacker when cut sheet is used.
- Tear Off
  -When continuous paper is used, pressing it moves a page to the Tear-Off position. Pressing it again moves a next page to the TOF position.
- Font
  -Pressing it selects one of the following fonts when the Micro Adjust is enabled; Draft, Draft Condensed, Roman, Sans serif, Courtier, Prestige, Script and others.

NOTE: *"Others" refers to the fonts selected in the Default Setting Mode.*

- Micro Adjust
  -Micro Adjust ↓ / ↑ switches are effective when the Micro Adjust function is enabled by the Pause switch.
  -Pressing the Micro Adjust ↓ / ↑ switches executes micro feed backward and forward by 0.141 mm (1/180 inch).
  -The TOF adjustment is enabled in the TOF position after loading, and the Tear-off adjustment is enabled in the Tear-off position.

1.4.2.2 Operation at Power-on

- Self test
  Prints the self test pattern. To cancel it, make the printer pause and turn off the power.
- Default setting
  Starts the default setting mode. See 1.4.2.3 "Default Setting".
- Data Dump
  Starts the data dump mode, in which all the input data are printed as hexadecimal numbers and corresponding characters.
- Clear EEPROM
  Resets the printer to the factory default setting, which is not always proper for each market demand.
  (i.e. This function is for emergency.)
  Clear Areal EEPROM data except 00H to 1FH.
- Clear EEPROM for Driving Line count for ribbon change timing.
  Resets the diving Line count for ribbon change timing.
- Bi-d adjustment
  Starts the Bi-d adjustment mode. See 1.4.2.4 "Bi-d. Adjustment".
- Demonstration
  Not available.

1.4.2.3 Default Setting

There are some parameters that can be changed by users and will be referred at the time of initialization of the printer.

- Setting mode

1. Enter Default Setting mode.
   The method of selecting language for "Usage of this mode" is printed.
2. Select language for "Usage of this mode" with the LF/FF button.
   Font LEDs show the language for "Usage of this mode" that is currently selected. This section will be advanced one by one as the button is pressed and the On/Off/Blink/2-Blink of those three LEDs will also be changed according to the selection.
3. Press the Tear Off button.
   The current setting and the "Usage of this mode" by selected language will be printed on the paper set in the paper path at that time.
4. Select Menu by the Tear-Off button.
   Font LEDs show the menu which is selected at that time. The selection will be advanced one by one as the button is pressed and the combination of those three LEDs status of On/Off/Blink/2-Blinks will be changed according to the selection.

5. Select setting value with the LF/FF button.
   Tear Off/ Bin LEDs and Paper Out LED show that the menu's value by status of On/Off/Blink/2-Blinks. That value can be changed by pressing the Tear Off/ Bin button and the LEDs, the status of On/Off/Blink/2-Blinks will be changed as the button is pressed.
6. When the LF/FF button is pressed, the printer memorizes the last setting value.
7. Repeat (4) to (6).
   The other items can be changed in the same manner.
   The menu selection will return to the first menu after the last menu selection is over.
8. Turn the printer off.
   The setting is stored into non-volatile memory.

Item	Setting / Value *2
Page length for tractor	3 inch, 3.5 inch, 4 inch, 5.5 inch, 6 inch, 7 inch, 8 inch, 8.5 inch, **11 inch,** 70/6 inch, 12 inch, 14 inch, 17 inch
Skip over perforation	**OFF,** ON
Auto tear off	**OFF**, ON
Auto line feed	**OFF**, ON
Print direction	**Bi-d.**, Uni-d., Auto
Software	**ESC/P2**, IBM 2390 Plus
0 slash	**0**, ∅
High speed draft	OFF, **ON**
I/F mode	**Auto**, Parallel, Serial
Auto I/F wait time	**10 seconds**, 30 seconds
Baud rate	**19200BPS**, 9600BPS, 4800BPS, 2400BPS, 1200BPS, 600BPS, 300BPS
Parity	**None**, Odd, Even, Ignore
Data length	**8 bit**, 7 bit
Parallel I/F bidirectional mode	OFF, **ON**
Packet mode	**Auto**, OFF
Character table	Software version Italic, **PC437**, PC850, PC860, PC863, PC865, PC861, BARASCII, Abicomp, Roman8, ISO Latin 1, PC858, ISO 8859-15
	NLSP version Italic, **PC437**, PC850, PC437, Greek, PC853, PC855, PC852, PC857, PC864, PC866, PC869, MAZOWIA, Code MJK, ISO 8859-7, ISO Latin 1T, Bulgaria, PC774, Estonia, ISO 8859-2, PC 866 LAT., PC 866UKR, PC APTEC, PC708, PC720, PCAR 864, PC860, PC865, PC861, PC863, BRASCII, Abicomp, Roman8, ISO Latin 1, PC858, ISO 8859-15, PC771
International character set for Italic table	**Italic U.S.A.**, Italic France, Italic Germany, Italic, U.K., Italic Denmark 1, Italic Sweden, Italic Italy, Italic Spain 1
Pitch	**10cpi**, 12cpi, 15cpi, 17cpi, 20cpi, Proportional
Font*1	OCR-B, Orator, Orator-S, Script C, **Roman T**, Sans serif H
Auto CR (IBM 2390 Plus)	**OFF**, ON
A.G.M (IBM 2390P plus)	**OFF**, ON
Manual feed wait time	1 second, **1.5 seconds**, 2 seconds, 3 seconds
Buzzer	OFF, **ON**
Roll paper	**OFF**, ON

NOTE: **1: One of the founts selected in the default setting is corresponding to others (=other font) on the control panel.*
Following fonts are not selected in the default setting mode;
Draft, Draft Condensed, Roman, Sans Serif, Courier, Prestige, and Script.

NOTE: *Settings with **Bold** are standard factory settings.*

1.4.2.4 Bi-d. Adjustment

Bi-d. adjustment can be performed by users. Bi-d. adjustment method is as follows.

1. Turning the printer on while pressing the Pause switch. The guide to adjust Bi-d alignment in this mode and the first alignment pattern will be printed.
2. Select the most closely aligned number by pressing the LF/FF (↓) and Load/Eject (↑) switches.
   Font LEDs and Pause LED show the pattern number which is selected at that time. The selection is advanced one by one as the switch is pressed, and the combination of On/Off/Blink of those three LEDs is also changed according to the selection.
3. Fix the selected number by pressing the Tear-Off switch.
   Selected number is fixed and the next alignment pattern is printed.
4. Repeat step 2 to 3 until finishing Bi-d adjustment for LQ mode.

   Following adjustment is executed.

   1. Bi-d. adjustment for draft mode
   2. Bi-d. adjustment for Bit Image (ESC *26H) Mode
   3. Bi-d. adjustment for LQ mode

5. Turn the printer off.
   The setting is stored into non-volatile memory.

1.4.3 Errors

- ☐ Paper out error:
  When the printer fails to feed a sheet, it goes a paper out error.
- ☐ Release lever error:
  When release lever position is wrong, it goes a release lever error.
- ☐ Fatal error:
  Carriage control error and Power supply voltage error.

1.5 Control codes

- Control codes = ESC/P2

1.6 Initialization

- Power-on initialization
  The initialization of this level is activated by power-on or cold-reset command (remote RS command).
  This initialization is;
  - to initialize the printer mechanism.
  - to execute Operator initialization.
- Operator initialization
  The initialization of this level is activated by -INT signal (negative pulse).
  This initialization is;
  - to clear the all buffers of data.
  - to cancel the download character definition.
  - to make the printer stand-by state, if no errors occur.
  - to execute Software initialization.
- Software initialization
  The initialization of this level is activated by the control code ESC@.
  This initialization is;
  - to clear the unprinted data.
  - to make the printer's setting defaults.

1.7 PAPER

1.7.1 PAPER SPECIFICATIONS

☐ Cut sheet (single sheet, not multi part)

Table 1-2. Cut Sheet (Single)

		Manual insertion		CSF single-bin	
		Minimum	Maximum	Minimum	Maximum
Width	(inch) (mm)	(3.9) 100	(10.1) 257	(7.2) 182	(8.5) 216
Length	(inch) (mm)	(3.9) 100	(14.3) 364	(10.1) 257	(14.0) 356
Thickness	(inch) (mm)	(0.0025) 0.065	(0.0055) 0.14	(0.0028) 0.07	(0.0055) 0.14
Weight	(g/m^2) (lb.)	52 (14)	90 (24)	64 (18)	90 (24)
Quality		Plain paper, Reclaimed paper Not curled, not folded, not crumpled		Plain paper, Reclaimed paper Not curled, not folded, not crumpled	

NOTE: *Printing on reclaimed paper is available only under normal temperature and humidity conditions.*

☐ Cut sheet (multi part)

Table 1-3. Cut Sheet (Multi Part)

		Minimum	Maximum
Width	(inch) (mm)	(3.9) 100	(10.1) (257)
Length	(inch) (mm)	(3.9) 100	(14.3) 364
Copies		1 original + 3 copies	
Total Thickness	(inch) (mm)	(0.0047) 0.12	(0.013) 0.32
Weight (one sheet of multipart)	(g/m^2) (lb.)	40 (12)	58 (15)
Quality		Plain paper, Reclaimed paper Not curled, not folded, not crumpled.	
Jointing		Line glue at the top or one side of form.	

NOTE: *Printing on reclaimed paper is available only under normal temperature and humidity conditions.*

NOTE: *Type of paper of multi-part forms should be Carbon-backed. Do not use Carbon-interleaved.*

☐ Envelope

Table 1-4. Envelope

			Minimum	Maximum
Envelop (No. 6)	Width	(inch) (mm)	(6.5) 165	
	Length	(inch) (mm)	(3.6) 92	
Envelop (No. 10)	Width	(inch) (mm)	(9.5) 241	
	Length	(inch) (mm)	(4.1) 105	
Total Thickness		(inch) (mm)	(0.0063) 0.16	(0.0205) 0.52
			The difference of thickness at the printable area is within 0.25mm (0.0098 inch).	
Weight		(g/m^2) (lb.)	45 (12)	90 (24)
Quality			BOND paper, PLAIN paper or AIR MAIL No glue at a flap Not curled, not folded, not crumpled	

NOTE: *Printing on reclaimed paper is available only under normal temperature and humidity conditions.*

NOTE: *Set the longer side of envelope horizontally.*

☐ Continuous paper (Single sheet and Multipart)

Table 1-5. Continuous Paper (Single Sheet & Multi Part)

		Rear Entry		Bottom Entry	
		Min.	Max.	Min.	Max.
Width	(inch) (mm)	(4) 101.6	(10) 254	(4) 101.6	(10) 254
Length (one page)	(inch) (mm)	(4) 101.6	(22) 558.8	(4) 101.6	(22) 558.8
Copies		1 original + 3 copies		1 original + 3 copies	
Total Thickness	(inch) (mm)	(0.0025) 0.065	(0.013) 0.32	(0.0025) 0.065	(0.013) 0.32
Weight (not multipart)	(g/m^2) (lb.)	52 (14)	82 (22)	52 (14)	82 (22)
Weight (one sheet of multipart)	(g/m^2) (lb.)	40 (12)	58 (15)	40 (12)	58 (15)
Quality		Plain paper, Reclaimed paper, Carbonless multipart paper		Plain paper, Reclaimed paper, Carbonless multipart paper	
Jointing		Point glue or paper staple (both sides)		Point glue or paper staple (both sides)	

☐ Labels

Table 1-6. Continuous Paper with Labels

		Rear Entry		Bottom Entry	
		Min.	Max.	Min.	Max.
Label size		---		See the figure below.	
Base sheet width	(inch) (mm)	---	---	(4) 101.6	(10) 254
Base sheet length (one page)	(inch) (mm)	---	---	(4) 101.6	(22) 558.8
Base sheet thickness	(inch) (mm)	---	---	(0.0028) 0.07	(0.0035) 0.09
Total thickness	(inch) (mm)	---	---	(0.0063) 0.16	(0.0075) 0.19
Label weight	(g/m^2) (lb.)	---		64 (17)	
Quality		---		AVERY CONTINUOUS FORM LABELS, AVERY MINI-LINE LABELS or the same quality labels	

NOTE: *Printing on labels is available only under normal temperature and humidity conditions.*

NOTE: *The base sheet of labels must be continuous paper.*

NOTE: *Continuous paper with labels should be inserted from the bottom entrance.*

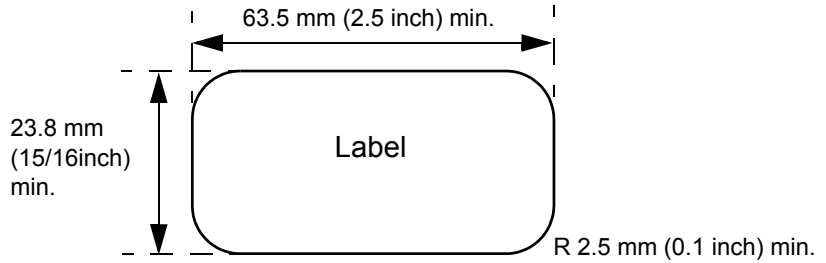


Figure 1-6. Printable Area-Label

☐ Roll paper

Table 1-7. Roll Paper

		Minimum	Maximum
Width	(inch) (mm)	(8.5) 216	
Length	(inch) (mm)	- - -	
Thickness	(inch) (mm)	(0.0028) 0.07	(0.0035) 0.09
Weight	(g/m^2) (lb.)	52 (14)	82 (22)
Quality		Plain paper, Not curled, not folded, not crumpled	

1.7.2 Printable Area

☐ Cut sheets

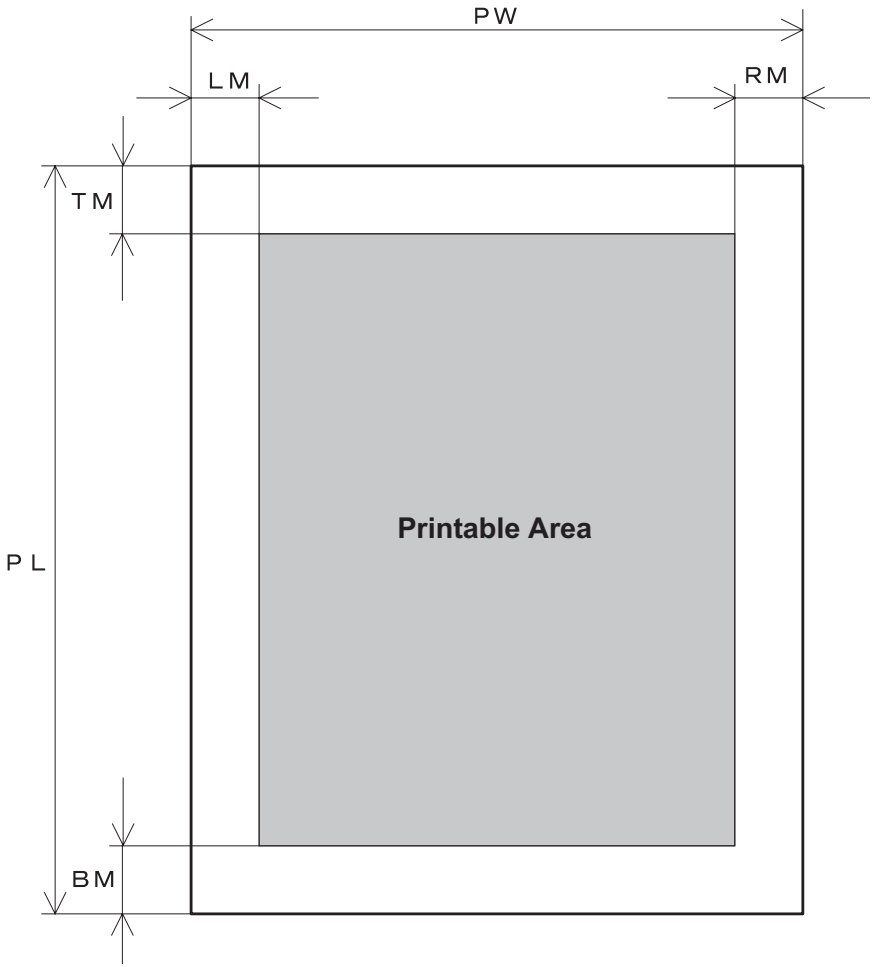


Figure 1-7. Printable Area for Cut Sheet

Table 1-8. Printable Area for Cut Sheets

	Single Sheet	Multi Part
PW (Width)	Refer to 1.7.1 "PAPER SPECIFICATIONS"	Refer to 1.7.1 "PAPER SPECIFICATIONS"
PL (Length)	Refer to 1.7.1 "PAPER SPECIFICATIONS"	Refer to 1.7.1 "PAPER SPECIFICATIONS"
LM (Left Margin)	When PW<=229 mm: 3 mm or more When PW=257 mm: 24mm or more	When PW<=229 mm: 3 mm or more When PW=257 mm: 24mm or more
RM (Right Margin)	When PW<=229 mm: 3 mm or more When PW=257 mm: 24mm or more	When PW<=229 mm: 3 mm or more When PW=257 mm: 24mm or more
TM (Top Margin)	4.2 mm or more	4.2 mm or more
BM (Bottom Margin)	4.2 mm or more	4.2 mm or more

NOTE: *The maximum horizontal printable area is 203.2mm.*

☐ Envelop

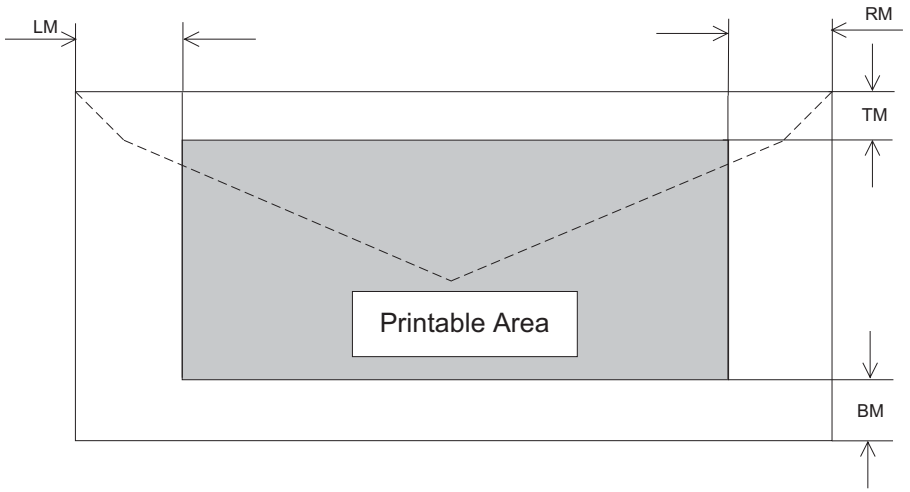


Figure 1-8. Printable Area for Envelop

Table 1-9. Printable Area for Envelope

	Envelope Printable Area
PW (Width)	Refer to 1.7.1 "PAPER SPECIFICATIONS"
PL (Length)	Refer to 1.7.1 "PAPER SPECIFICATIONS"
LM (Left Margin)	3 mm or more
RM (Right Margin)	3 mm or more
TM (Top Margin)	4.2 mm or more
BM (Bottom Margin)	4.2 mm or more

NOTE: *The maximum horizontal printable area is 203.2mm.*

☐ Continuous paper

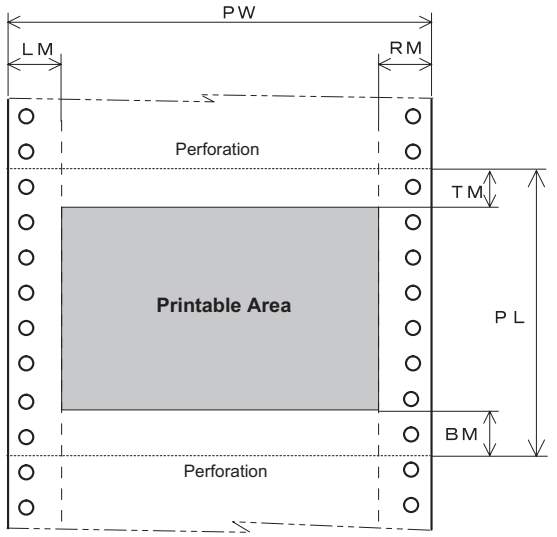


Figure 1-9. Printable Area for Continuous Paper

Table 1-10. Printable Area for Continuous Paper

	Continuous Paper
PW (Width)	Refer to 1.7.1 "PAPER SPECIFICATIONS"
PL (Length)	Refer to 1.7.1 "PAPER SPECIFICATIONS"
LM (Left Margin)	When PW<=241.3mm: 13 mm or more When PW=254 mm: 24mm or more
RM (Right Margin)	When PW<=241.3mm: 13 mm or more When PW=254 mm: 24mm or more
TM (Top Margin)	4.2 mm or more
BM (Bottom Margin)	4.2 mm or more

NOTE: *The maximum horizontal printable area is 203.2mm.*

☐ Roll paper

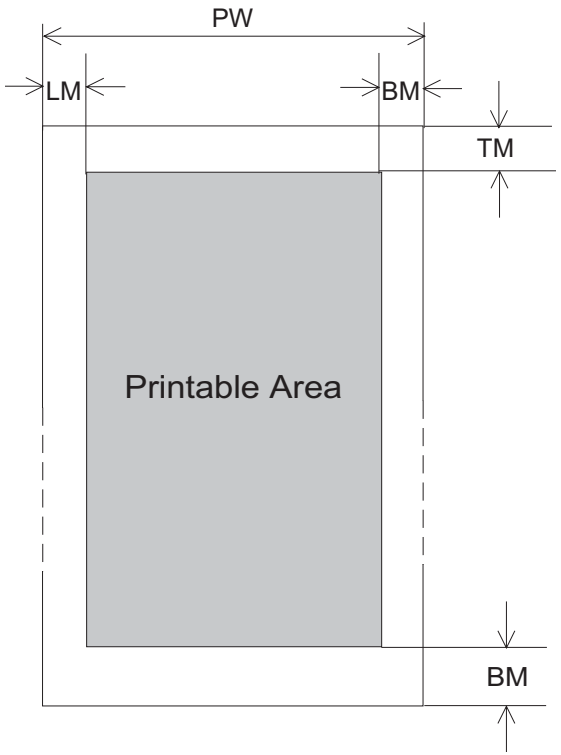


Figure 1-10. Printable Area for Roll Paper

Table 1-11. Printable Area-Roll Paper

	Continuous Paper
PW (Width)	Refer to 1.7.1 "PAPER SPECIFICATIONS"
PL (Length)	Refer to 1.7.1 "PAPER SPECIFICATIONS"
LM (Left Margin)	3 mm or more
RM (Right Margin)	3 mm or more
TM (Top Margin)	4.2 mm or more
BM (Bottom Margin)	4.2 mm or more

1.8 Accessories

Enclosed Items	Quantity
User's manual	1
Driver disk	1
Ribbon cartridge (Black)	1
Power supply cable (230 V Version)	1

Consumable	Description
Fabric ribbon cartridge (Black)	#7753
Fabric ribbon pack (Black)	#7755
Film ribbon cartridge (Black)	#7768
Fabric ribbon cartridge (Color)	S015077

Options	Description
Cut sheet feeder	C80637*
Pull tractor unit	C80030*
Roll paper holder	#8310
Color upgrade kit	C83211*
Epson Net 10/100 Base TX Ext. Print Server	C82378*

1.9 Difference between LQ-300+ and LQ-305K

The LQ-300+ and the LQ-305K are only differnet in the following points, and all other components are remained the same.

- EEPROM setting
  Model ID setting is different.
- New function: “Condensed Print Mode” is added
  - Selectable from the control panel (Enable/Disable)
  - “Condensed Print Mode” select command support
    (ESC (SI nL nH m)

CHAPTER

2

OPERATING PRINCIPLES

2.1 Overview

LQ-300+ consists of the printer mechanism and electric circuit boards.

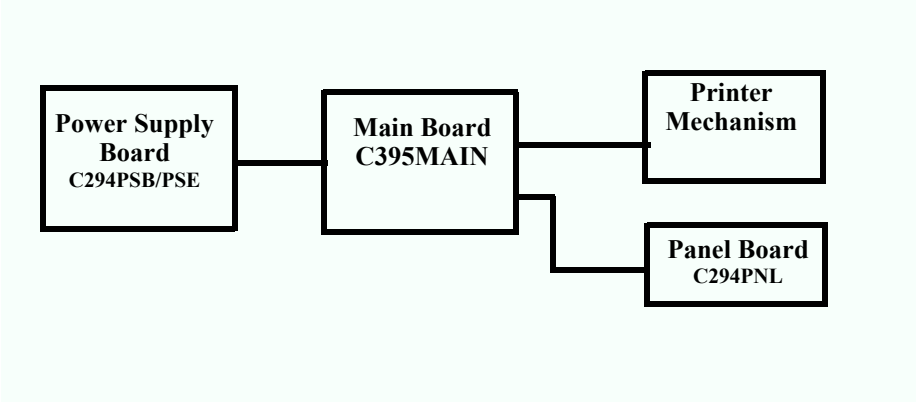


Figure 2-1. Component Unit

- Circuit board
  - Main (control circuit): C395MAIN Board
  - Power: C294PSB / C294PSE Board
  - Panel: C294PNL Board

The following sections describe the operating principles of each unit.

2.2 Printer Mechanism

The following is main components of the LQ-300+ printer mechanism.

- ☐ Printhead
- ☐ Carriage mechanism
  Carriage (CR) motor, Carriage home position (HP) detector
- ☐ Ribbon mechanism
  Color ribbon drive mechanism (option)
- ☐ Platen gap adjustment mechanism
  Adjust lever, Platen gap detector
- ☐ Paper feed mechanism
  PF motor, rear paper end (RPE)detector, bottom paper end (BPE) detector
- ☐ Release mechanism
  Release detector (REL)

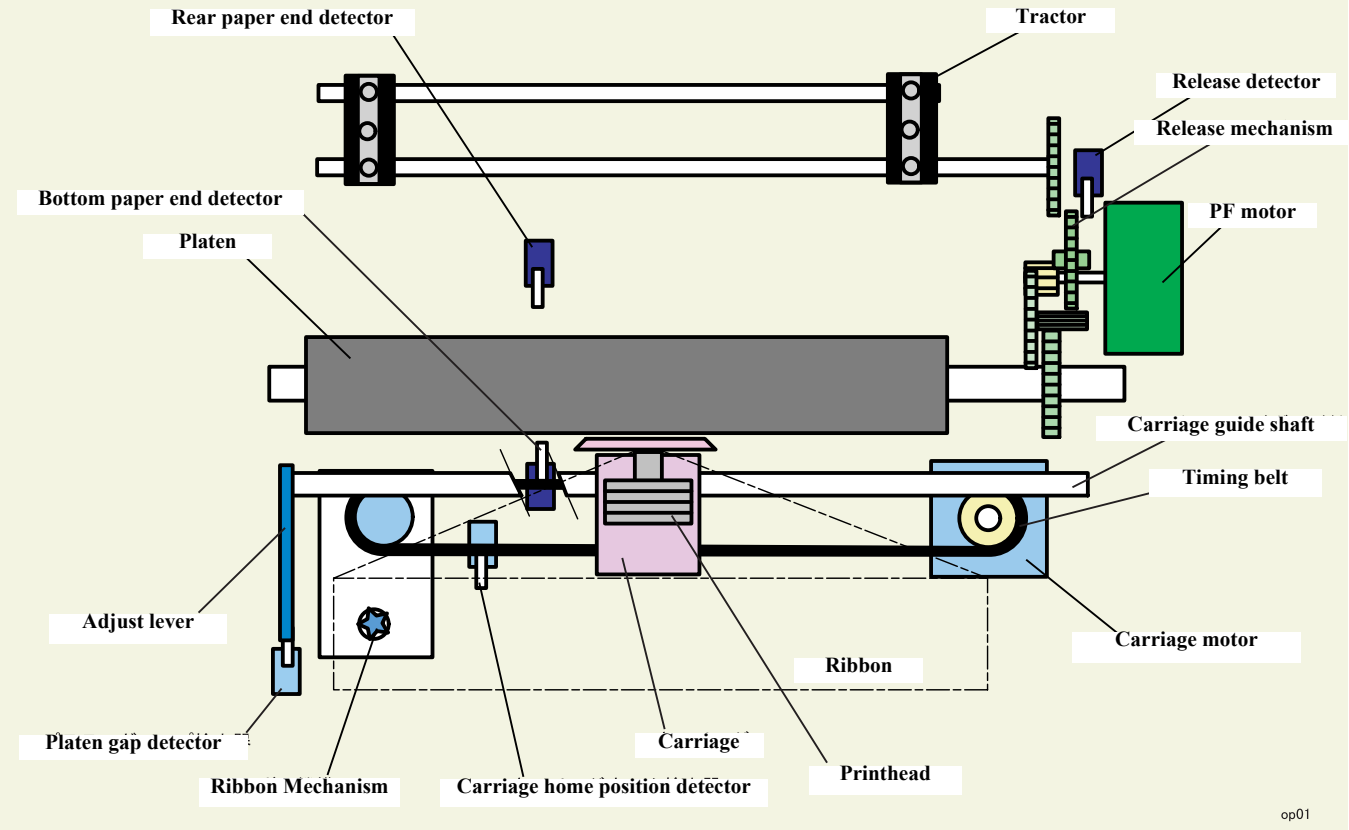


Figure 2-2. Printer Mechanism Block Diagram

2.2.1 Printhead

The table below shows the printhead specifications.

Table 2-1. Printhead Specifications

Item	Specification
Number of wires	24
Diameter of wire	ϕ0.20 mm
Wire configuration	See the figure below. Note: The figure is seen from the back of the head facing printing side.
Direct current coil resistance	54.7 ± 3.9Ω (at 25°C)
Number of coils	24
Head drive method	Rated voltage drive
Head drive voltage	35V ± 3.5V
Maximum peak current	• Normal Mode: 0.65A (38.5V x 270µs at 5°C) • Copy Mode: 0.67A (38.5V x 290µs at 5°C)
Head drive frequency	• Normal: 1350Hz or less • Copy: 1350Hz or less
Head life	• Black ribbon: 0.2 billion stroke/ wire or more • Color and film ribbon: 0.1 billion stroke/ wire or more
Environmental condition	• Temperature: 5 to 55°C • Humidity: 10 to 85% (

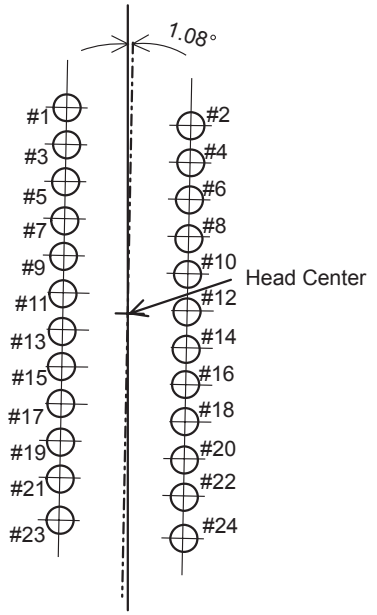


Figure 2-3. Wire Configuration

2.2.1.1 Buzzer Function

This printhead also works as a buzzer. The table below is buzzer specification.

Table 2-2. Buzzer Function -- Specification

Item	Specification
Head voltage	35V ± 3.5V
Drive frequency	2kHz, 1.5kHz

2.2.2 Carriage Mechanism

The following is the components of the LQ-300+ carriage mechanism and its explanation. (Refer to Figure 2-2.)

- Carriage: Mounts the printhead.
- CR motor: Drives carriage to the printing column direction.
- Timing belt: Transfers the drive from the CR motor to the carriage.
- Carriage guide shaft: Shifts the carriage parallel to the platen.
- HP detector: Detects carriage home position.

CR MOTOR

This printer uses stepping motor for CR motor. Open loop control switches the phases according to the setting period and this mechanism enables the carriage to move until the appointed position. The table below is the CR motor specifications.

Table 2-3. CR Motor Specifications

Item	Specification
Motor type	2-phase/200-pole hybrid stepping motor
Coil resistance	4.5Ω±10% (25°C)
Control method	Bi-polar drive
Phase drive	2-2 phase, 1-2 phase, W1-2 phase
Drive voltage	35VDC, +5% -10%
CR feed pitch	Minimum Resolution: 0.212 mm (1/120”) (2-2 phase, 1 pulse)

The following table shows the various carriage speed modes.

Table 2-4. Carriage Speed Mode

Carriage speed mode	CR drive frequency [Hz]	Printing mode	Phase drive [pps]	Current limit (A/phase)					Adjacent dot resolution [dpi]	Head drive frequency [Hz]	Printing speed	Carriage speed mode at power down	High or low speed printing
				Front rush	High speed	Normal speed	Low speed	Rear rush					
A	3600	Color	2-2	0.79	0.79	0.70	0.70	0.70	45	1350	High speed draft 10cpi	C	○
		BW	2-2	0.70	0.59	0.59	0.59	0.59					
B	3375	Color	2-2	0.79	0.79	0.70	0.70	0.70	48	1350	High speed draft 12cpi	E	○
		BW	2-2	0.70	0.59	0.59	0.59	0.59					
C	2700	Color	2-2	0.79	0.79	0.70	0.70	0.70	60	1350	High speed draft 15cpi Draft 10cpi Bit image 60 dpi	F	○
		BW	2-2	0.70	0.59	0.59	0.59	0.59			Draft 12cpi		
D	2250	Color	2-2	0.79	0.79	0.70	0.70	0.70	1440/21	1286	High speed draft 17cpi	F	○
		BW	2-2	0.70	0.59	0.59	0.59	0.59	72	1350	Bit image 72 dpi		
E	1800	Color	2-2	0.79	0.79	0.70	0.70	0.70	80	1200	Bit image 80 dpi	G	x
		BW	1-2	0.65	0.65	0.59	0.59	0.59	90	1350	High speed draft 20cpi Draft 15cpi Bit image 90 dpi		
F	1350	Both	1-2	0.65	0.65	0.59	0.59	0.59	120	1350	Draft 20/17cpi NLQ 10cpi Bit image 120 dpi	I	x
G	1125	Both	1-2	0.65	0.65	0.59	0.59	0.59	144	1350	Bit image 144 dpi	I	x
H	900	Both	1-2	0.65	0.65	0.59	0.59	0.59	180	1350	NLQ 15cpi	I	x
I	675	Both	1-2	0.65	0.65	0.59	0.59	0.59	240	1350	NLQ 17/20cpi	J	x
J	450	Both	1-2	0.65	0.65	0.59	0.59	0.59				-	x

CARRIAGE HOME POSITION (HP) DETECTOR

The table below is the HP detector specifications.

Table 2-5. HP detector Specifications

Item	Specification
Method	Mechanical contact method
Switching rate	0.6 to 1.0 mA, 5 VD±5%
Switching mode	• out of HP: close • within HP: open

HP detector detects the signal right after when the CR motor switches the phase.

2.2.2.1 High speed skip method

At no-printing area, the carriage moves at high speed compared to the normal carriage speed at printing. This is called carriage control.

2.2.3 Ribbon Mechanism

2.2.3.1 Ink Ribbon Shifting Mechanism

Ink ribbon shifting mechanism: CR motor drives timing belt and the timing belt driven pulley drives the ribbon shifting gears.

2.2.3.2 Color Ribbon Driving Mechanism (Option)

Color ribbon driving mechanism: shifts the color ribbon up and down to change the color area of the ribbon to be printed.

Color ribbon mechanism consists of the color shift (CS) motor, CS cam, ribbon detector, CS lever assembly and color cartridge holder. Color ribbon is installed on the color cartridge holder.

When CS motor revolves, 1) the pinion revolves CS cam, 2) the CS lever assembly on the CS cam shifts the color cartridge holder up and down and 3) drives ribbon up and down.

Table 2-6. CS Motor Specifications

Item	Specification
Motor type	2-phase/48-pole PM stepping motor
Coil resistance	150Ω ±5% (25°C, per 1 phase)
Control method	uni-polar rated voltage drive
Phase drive	2-2 phase
Drive voltage	36.75 ± 1.75 VDC
Consuming current	• Operating, peak current: 245 mA • Non-operating: 20 mA
Drive frequency	500 pps

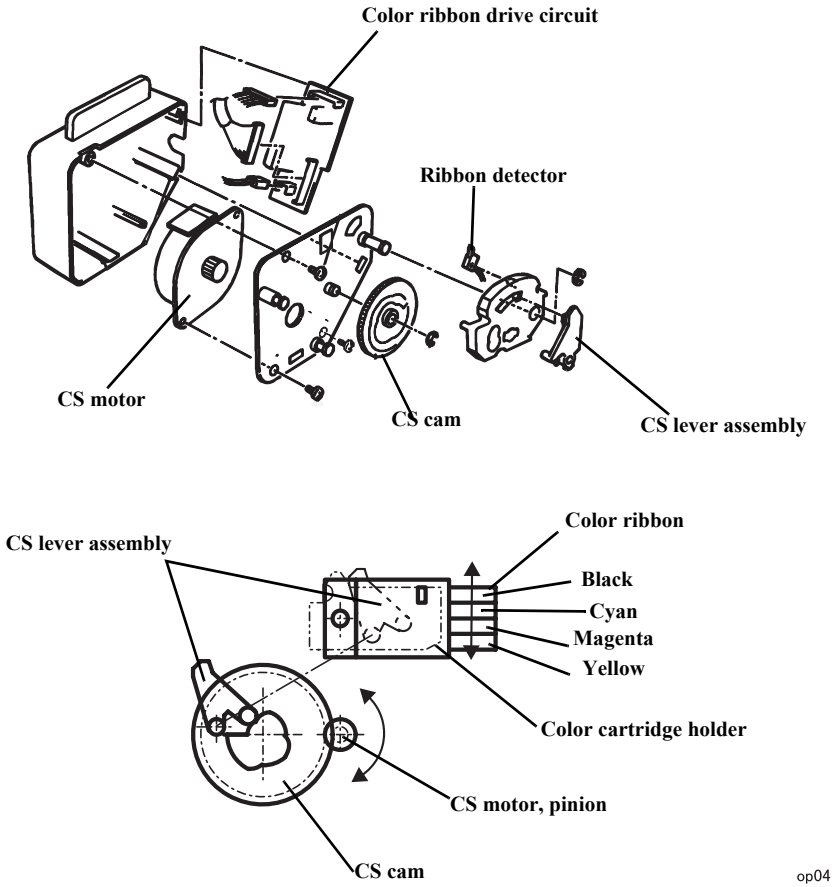


Figure 2-4. Color Ribbon Driving Mechanism

RIBBON CARTRIDGE DETECTOR

Ribbon detector detects if the color ribbon is installed or not.

- Detect Timing
  - When the power is applied.
  - When recovering from the economy mode.
  - When the printing is started.

Table 2-7. Ribbon Detector Specifications

Item	Specification
Method	Mechanical contact method
Switching rate	0.6 to 1.0 mA
Switching mode	• Color ribbon cartridge is installed: High • Black ribbon cartridge is installed or ribbon is not installed: Low

AVOID COLOR FROM MIXING

To avoid the color area on the ribbon from mixing up each other or minimize the color mixing up, the printing is done by the following order when printing green, violet and orange.

Table 2-8. Color Printing Order

Color	First color	Second color
Green	Yellow	Cyan
Orange	Yellow	Magenta
Violet	Magenta	Cyan

COLOR MECHANISM INITIALIZATION

The printer mechanism initializes when the power is applied or when recovering from the energy saving mode.

- Color mechanism initialization
  Color mechanism initialization shifts color mechanism for the black ink area to be at the home position. Color mechanism initialization shifts the carriage at the same time to prevent the ribbon from hanging on the printhead.
  When the buffer is cleared or when the printer is under the pause condition, the color mechanism initializes and waits for the next printing command.

2.2.4 Platen Gap Adjustment Mechanism

This mechanism is to adjust the distance between the platen and the printhead (platen gap) according to the paper thickness.

The following is the components of the LQ-300+ platen gap adjustment mechanism and its explanation. (Refer to Figure 2-5.)

- Carriage: Mounts the printhead.
- Carriage guide shaft: Shifts the carriage horizontally.
- Adjust lever and Parallelism adjust bushing:
  Installed at the both ends of the carriage guide shaft
- Platen gap detector (PG_SW)

Carriage guide shaft is eccentric toward the adjust lever rotating center. Due to this, when rotating the adjustment lever back and forth, the printhead shifts toward and against the platen to adjust the platen gap. When printing on thick paper such as postcards and envelops, set the adjust lever over the 1st level. PG detector shifts the printer to the copy mode from the printing mode. Printing speed will be lowered but it prevents wire from breaking off.

PLATEN GAP (PG_SW) DETECTOR

The following is PG_SW specification.

Table 2-9. PG_SW Detector Specifications

Item	Specification
Method	Mechanical contact method
Switching rate	0.6 to 1.0 mA, 5 VD±5%
Switching mode	• Normal mode: PG = -1 to 1: close • Copy mode: PG = 2 to 6: open

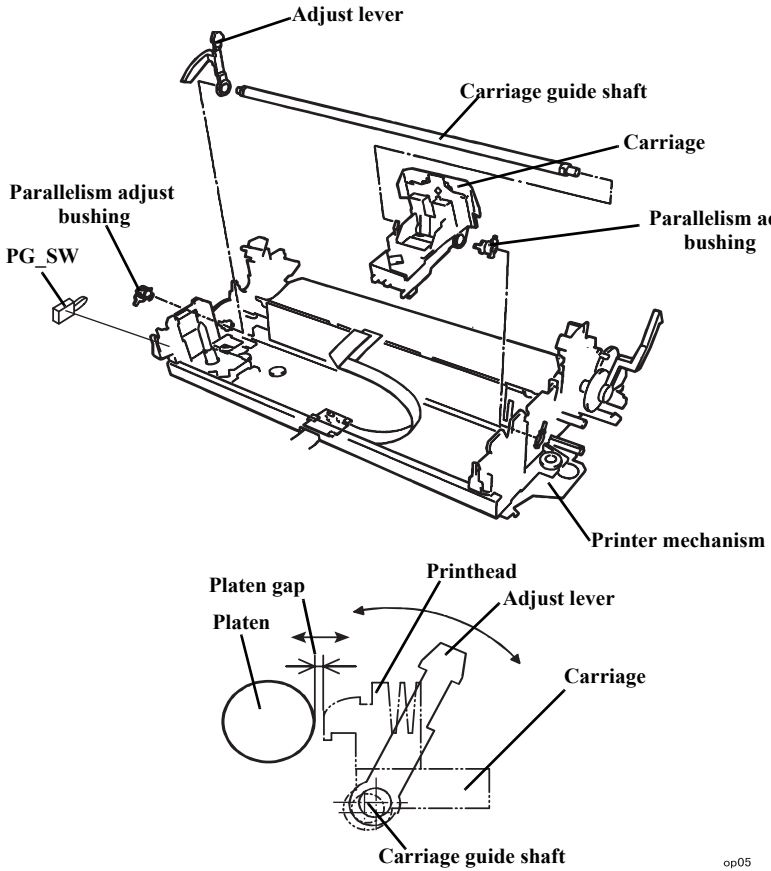


Figure 2-5. Platen Gap Adjustment Mechanism

2.2.5 Paper Feed Mechanism

This mechanism consists of paper feed motor (PF motor), paper feed gears, platen, rear paper end detector, bottom paper end detector and push tractor unit. (Refer to Figure 2-2.)

- Paper Feed Method
  - Friction feed
  - Push tractor feed
    Uses standard push tractor
  - Push-pull tractor feed
    Uses standard push tractor + Option tractor
  - Pull tractor feed
    Replace the standard push tractor with option tractor
- Feeder
  - Simple CSF (option)
  - Tractor (standard)
    Push / Pull
  - Pull tractor (option)
  - Roll paper holder
- Paper path
  - Manual loading
    Rear paper load, top paper load
  - CSF
    Rear paper load, top paper load
  - Push tractor
    Rear paper load, top paper load
  - Pull tractor
    Rear / Bottom paper load, top paper load
- Auto loading
  When loading paper manually, push paper between the platen and the driven paper load roller. Paper will be loaded automatically.

PF MOTOR

LQ-300+ uses stepping motor for PF motor. Open loop control switches the phases according to the setting period and this mechanism loads and carries paper to the appointed position and eject paper.

The table below is the PF motor specifications.

Table 2-10. PF Motor Specifications

Item	Specification
Motor type	2-phase/96-pole Hybrid stepping motor
Coil resistance	12.0Ω ±10% (25°C, per 1 phase)
Control method	bi-polar rated current drive
Phase drive	2-2 phase, 1-2 phase
Drive voltage	35VDC, +5% -10% (This voltage is added to driver.)
Drive current	0.794A±8%, 0.709A±8%, 0.236A±8%
Paper feed pitch	Minimum Resolution: 1/360” 1-2 phase, 2 pulse)

RPE DETECTOR

RPE detector is installed on the paper path at the back of the printer. The table below shows the RPE detector specifications.

Table 2-11. RPE Detector Specifications

Item	Specification
Method	Mechanical contact method
Switching rate	0.6 to 1.0 mA, 5 VD±5%
Switching mode	• Paper inside: open • No paper: close

BPE DETECTOR

BPE detector is installed right under the platen. The table below shows the BPE detector specifications.

Table 2-12. BPE Detector Specifications

Item	Specification
Method	Mechanical contact method
Switching rate	0.6 to 1.0 mA, 5 VD±5%
Switching mode	• Paper inside: open • No paper: close

2.2.5.1 Page Length Measurement

Page length measurement is a process to convert the following value to the number of printing lines.

Value = [The number of paper feed pulse from the paper top (top margin: 4.2mm) until RPE detector detects paper end] + [forms over-ride specified paper feed pulse] - [adjustment value]

- When CSF is used:
  The uncertainty of the paper end detector may vary the number of printing lines within the same paper size. To avoid this, when CSF is used, page length measurement calculates the printable lines and if the paper is longer than the printable lines, the number of printing line is considered the printable lines (fixed value).
  When paper is shorter than the printable lines, the printer prints the fixed number of lines by forms over-ride function (which allows the fixed number of lines to be printed even when RPE detector detects paper end).
- When CSF is not used:
  When loading paper manually or when tractor feed is used, the number of printing lines of paper end is determined by forms over-ride function after BPE or RPE detector detects paper end.

2.2.6 Release Mechanism

This mechanism switches the flow of PF motor driving forth between to the friction feed and to the tractor feed.

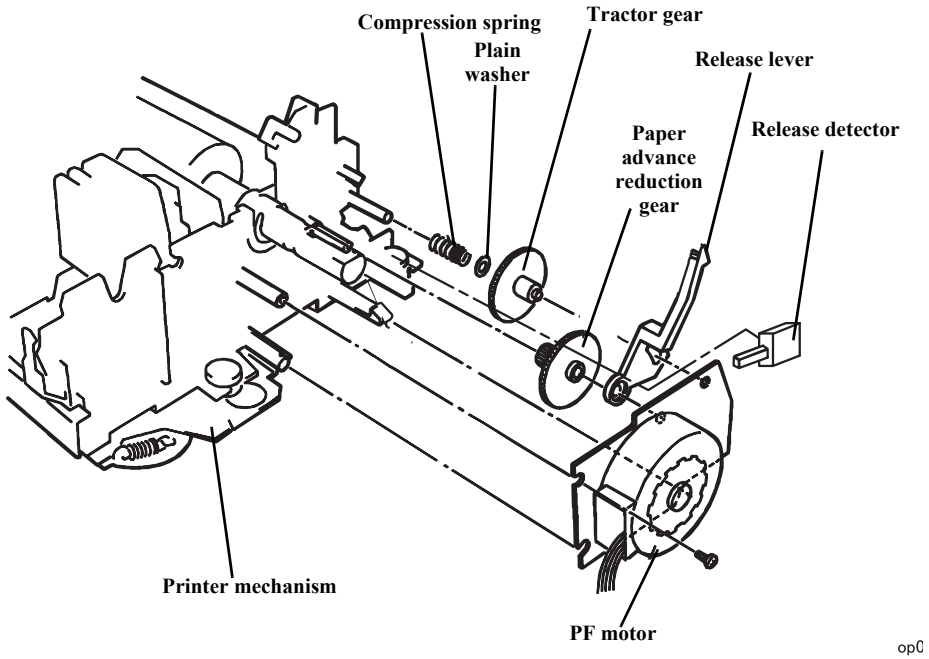


Figure 2-6. Release Mechanism

Release mechanism consists of the following.

- Release lever:Shifts tractor low speed gears back and forth.
- Tractor gear
- Paper advance reduction gear:Transfers the PF motor driving forth to the tractor gear.
- Release detector (REL): Detects the release lever position.

The table below shows the release detector specifications.

Table 2-13. Release Detector Specifications

Item	Specification
Method	Mechanical contact method
Switching rate	0.6 to 1.0 mA, 5 VD±5%
Switching mode	• Friction: open • Tractor: close

2.2.7 Other Special Functions

2.2.7.1 Energy saving mode

This function saves electric consumption when the printer is in the standby mode. This mode turns hold current of PF motor, CR motor and CS motor OFF.

2.2.7.2 Quiet Mode

Quiet mode lowers printing temperature. When this mode is selected, carriage speed will be lowered to the power down mode speed. Refer to Table 2-4, “Carriage Speed Mode,” on page 35.

2.3 Electric Circuit Operating Principles

2.3.1 C395MAIN Board

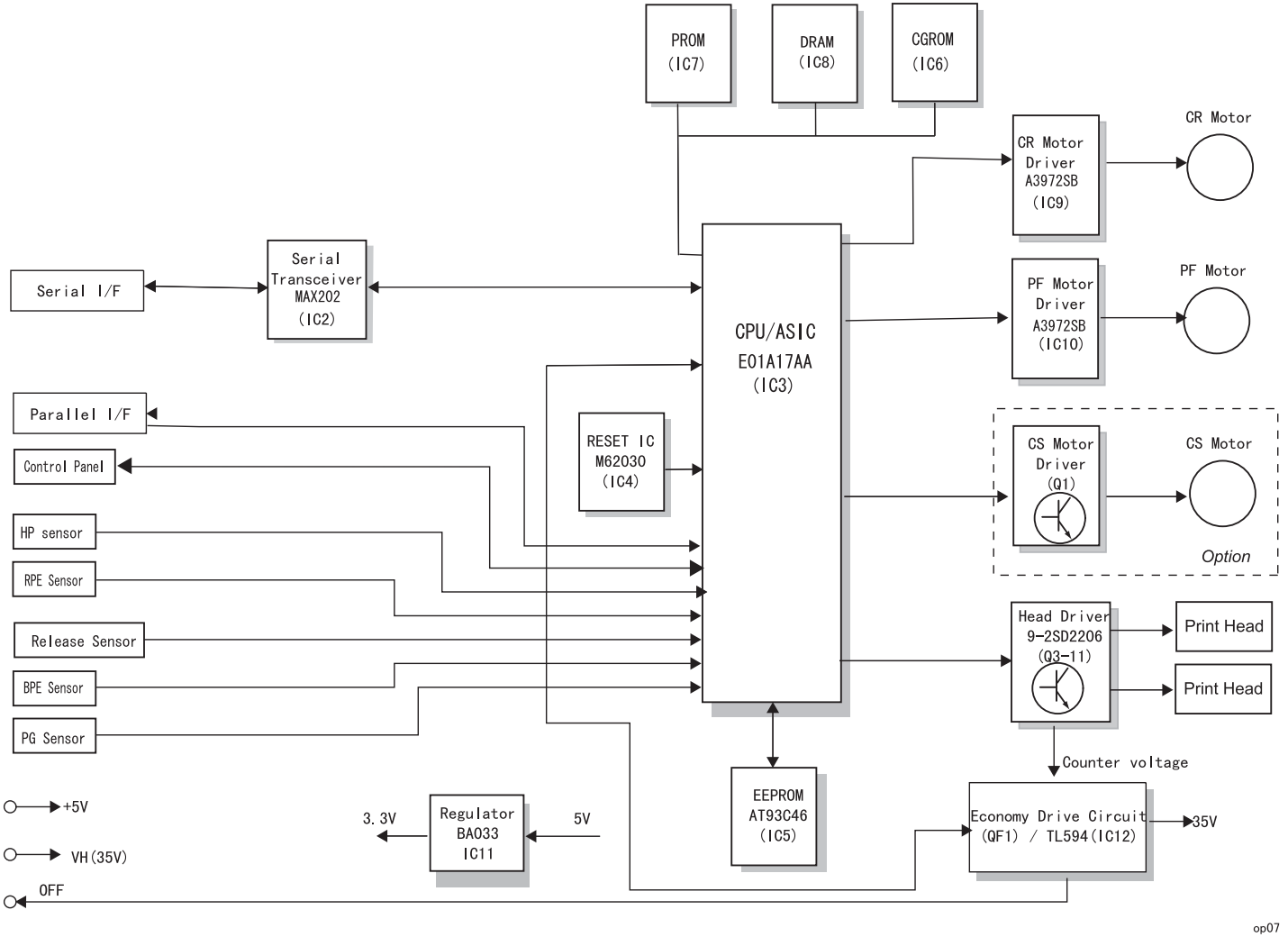


Figure 2-7. C395 MAIN Block Diagram

Table 2-14. Main ICs and Functions

Elements	Location	Function
CPU/ASIC	IC3	E01A17Axx CPU • Outside clock 19.66 MHz/ Inside clock 39.32 MHz • Various DMA • A/D converter (3ch) G/A • Bit Manipulation Unit (Print Date Conversion) • I/O control unit LED output/Reset control report EEPROM (94C46) report Energy Saving mode CS motor detector (option) • Input buffer control unit • CR/PF/CS motor unit • Head control unit
CGROM_	IC6	CG (Font)
PROM	IC7	8M / 16Mbit • Stores firmware • CG
DRAM	IC8	1/2/4M bit switching method, SPJ package 40 pin • Various buffer, work area
EEPROM	IC5	AT93C46, 1kbit, SOP 8pin • Stores default values and various parameters
RESET IC	IC4	M62030FP, 8 pin • CPU reset
CR Motor Driver	IC9	A3972SB
PF Motor Driver	IC10	A3972SB
Serial I/F Transceiver	IC2	MAX202

Table 2-14. Main ICs and Functions

Elements	Location	Function
Regulator IC	IC11	BA033FP • Generates 3.3V logic voltage
Economy Drive Circuit	IC12	TL594CN • 95V rated voltage circuit • Detects over voltage (over 150V) and sends OFF signal to the power supply boards.

2.3.2 C294PSB / C294PSE Board

LQ-300+ generates power supply by 2 types of power supply boards: C294PSB (100V) and C294PSE (200V). The table below shows the power supply boards input voltage specifications.

Table 2-15. Power Supply Boards Input Voltage Specifications

Circuit	Input voltage	Fuse specification
C294PSB	99 - 132VAC	ULTSC-2.5A-NI
C294PSE	198 - 264VAC	HT 1.25A

2.3.2.1 Electric Circuit

The power supply board supplies two types of power for control circuit and driving mechanism. The table below shows output voltage and its use.

Table 2-16. Output Voltage and its Use

Output voltage	Use
35 V +5%/ -10%	Drive
5 V ± 5%	Logic Voltage*

NOTE: **: Core voltage of CPU and G/A is 3.3V and it is generated by the regulator IC on the MAIN board form +5VDC.*

CHAPTER

3

TROUBLESHOOTING

3.1 Overview

This chapter describes how to troubleshoot problems when any problems occurred to the printer. Refer to troubleshooting flowcharts in this chapter to identify a defective part and an appropreate repair for it.

WARNING

- **Never touch printhead and any motors right after printing since they are highly heated.**
- **When disassembling the printer, be sure to disconnect the power cable and remove the interface cable.**

CAUTION

- **Be sure to use specified tools for servicing to maintain the quality.**
- **Make sure to apply specified oil, grease and glue.**
- **Perform adjustment as specified.**

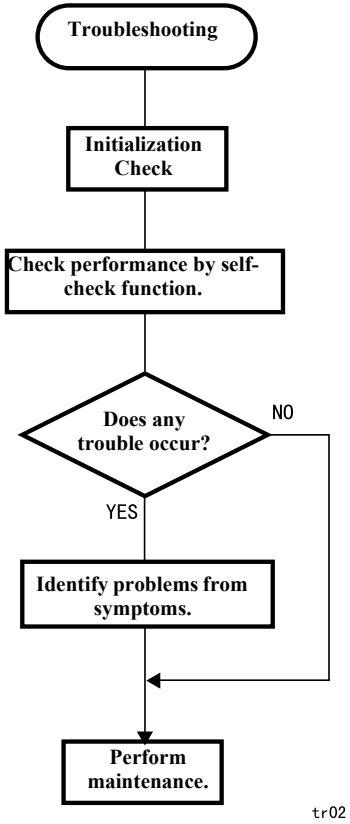


Figure 3-1. Troubleshooting Procedure

3.2 Troubleshooting

3.2.1 Initialization Check

Before troubleshooting, check the following basic items.

1. When a printer can perform printing, perform self-test and check if any troubles occur.
2. When the printer cannot perform any printing, check the setting by “Default Setting”. (Refer to Chapter 1.)
3. Check if the outside and inside the printer is noticeably dirty or if any parts are broken. If there is dirt, perform cleaning referring to Chapter 6 “Maintenance”.
4. Make sure each harness is connected properly.
5. Make sure no remarkable friction among printer mechanism gears. Make sure all gears are linked properly.
6. Make sure there is no dirt nor scratch on rollers inside the printer.
7. Perform EEPROM clear as needed. Inside setting is reset to the factory default setting. (Refer to Chapter 1.)

3.2.2 Check Performance By Self-Check Function

LQ-300+ has self-check function which supervises the printer condition constantly. If any problem occurs, it indicates an error by indicator LEDs and in some cases it notifies errors to the operator by beeping the buzzer. Identify an error cause, referring to the indication first. If an error is not solved, perform unit repair.

3.2.2.1 Indicator LEDs

The table below shows the indicator LEDs and the printer conditions.

Table 3-1. Indicator LEDs

Printer Condition	Pause	Paper Out	Front	Buzzer
Pause	ON	-	-	-
Paper Out Error	ON	ON	-	Short beep x3
Release Lever Error	ON	-	-	Long beep x5
Paper Eject Warning	ON	BLINK	-	-
MICRO Adjust	BLINK	-	-	-
Tear Off	-	-	According to LED On/Off combination	-
Font Select	-	-	According to LED On/Off combination	-
Fatal Error	BLINK	BLINK	BLINK	-

- Paper Out Error
  This error will be indicated when the printer fails to feed paper or paper is run out.
  - Solution
    Set paper properly and try paper feed again.
- Release Lever Error
  This error will be indicated when a wrong release lever operation is performed. For example, if you change the release lever setting when the printer already starts feeding paper, this error will be shown.
  - Solution
    Reset the release lever.
- Fatal Error
  This error will be indicated when;
  -Carriage error is occurred.
  -Input voltage is abnormal.
  -Hardware problem is occurred.
  - Solution
    If it is a Carriage error, check if there is no obstacles for Carriage to move.
    If it is an input oltage problem, check power supply voltage.
    If it is a hardware problem, check the machine and electric circuit.

3.2.3 Identify Problems From Symptoms

This section contains procedures to identify problems from abnormal symptoms. Repair/replacement is usually performed as a unit, however, parts level replacement can be performed if neccasary.

Find your symptom referring to the table below and go to the corresponding table.

Table 3-2. Symptoms and Solutions

Symptom	Problems	Check Table
When power is applied, the printer does not operate.	Control panel LED does not operate at all.	Table 3-3 on page 47
	Printer mechanism does not operate at all.	Table 3-4 on page 47
When power is applied, the printer becomes fatal error.	• Control panel indicates fatal error. • The printer indicates error after initialization.	Table 3-5 on page 48
Self-test print is abnormal.	• Platen gap is not correct. • Printhead and ribbon mask is abnormal or their life are over. • Vertical direction printing quality is abnormal.	Table 3-6 on page 48
Paper feed is abnormal.	• Paper feed operation is not performed. • Paper switching is abnormal. • Line feed is not equal. • Skew is generated.	Table 3-7 on page 48
Control panel and switches do not operate properly.	• LED indication is abnormal. • Cannot input from switches.	Table 3-8 on page 48
Printing operation is abnormal when it is on-line.	• Self-test is normal, but the printing from host computer is abnormal.	Table 3-9 on page 49

Table 3-3. Control Panel LED Does Not Light On.

Cause	Check Point	Y/N	Solution
Blowout of a fuse on the power board.	Is a fuse on the power board blew out?	YES	Check the electric circuit and printer mechanism. If there is no short circuit, replace the fuse.
Connector is not connected to the power board.	Are connectors connected to the power board properly?	NO	Replace the power board.
Power switch is defective.	Is conductivity of the switch is OK?	YES	Replace the power board.
Power board is defective.	Are +5VDC and +35VDC OK when the power is on?	NO	Replace the power board.
Power board and the main board are not connected properly.	Is CN8 connected properly?	NO	Connect CN8 properly.
Main board is defective.	-	-	Replace the main board.
Control panel harness is not connected properly.	Is the harness of the control panel connected properly?	NO	Connect the harness properly.
Control panel board or harness is defective.	-	-	Replace the control panel.

Table 3-4. Printer Mechanism Does Not Operate.

Cause	Check Point	Y/N	Solution
Any of CN3 to CN12 is not connected to the main board properly.	Are all connectors connected properly?	NO	Connect them properly.
Main board is defective.	-	-	Replace the main board.
Printer mechanism is defective.	-	-	Replace the printer mechanism.

Table 3-5. When Power is Applied, the Printer Becomes Fatal Error.

Cause	Check Point	Y/N	Solution
CR motor harness is not connected properly.	Is CR motor harness CN10 connected properly?	NO	Connect it properly.
CR motor is defective.	-	-	Replace the CR motor.
HP detector harness is not connected properly	Is HP detector harness CN3 connected properly?	NO	Connect it properly.
HP detector is defective.	-	-	Replace the HP detector.
Power board is defective.	Is power voltage normal?	NO	Replace the power board.
-	-	-	Replace the main board and printer mechanism.

Table 3-6. Self Test Print is Abnormal.

Cause	Check Point	Y/N	Solution
Any of CN3 to CN12 is not connected to the main board properly.	Are all connectors connected properly?	NO	Connect them properly.
Printhead driver is defective.	-	-	Replace the main board.
Bi-d is not correct.	Are rows aligned properly when bi-directional printing is proceeded?	NO	Adjust Bi-D.
Printhead is defective.	Is there any dot missing?	YES	Replace the printhead.
Head FFC is not connected properly or broken.	-	YES	Replace the head FFC.
Platen gap is not correct.	Is printing too light / weak?	YES	Adjust the platen gap.
	Is there any dirt on printed documents?	YES	Adjust the platen gap.
Ribbon mask is defective.	Is there any dirt on printed documents?	YES	Replace the ribbon mask.

Table 3-6. Self Test Print is Abnormal.

Cause	Check Point	Y/N	Solution
Ribbon mechanism is defective.	Is ribbon advanced properly?	NO	Replace the ribbon mechanism parts.
Printer mechanism is defective.	-	-	Replace the printer mechanism.

Table 3-7. Paper Feed is Abnormal.

Cause	Check Point	Y/N	Solution
RPE detector or BPE detector is defective or not connected properly.	Check the sensors. Is there any abnormality?	NO	Replace the sensor.
		YES	Check the connection to the main board.
Paper switching mechanism is defective.	Switch the release lever. Is the paper loading direction switched?	NO	Replace the printer mechanism or check the connection.
	Can the release lever be switched?	NO	Replace the release sensor or check the connection.
Printer mechanism paper loading mechanism is defective.	When the power is off, can the printer feed paper by rotating the platen knob manually?	NO	Replace the printer mechanism or paper loading mechanism parts.
PF motor is defective.	Is PF motor normal?	NO	Replace the PF motor.
PF motor driver is defective.	-	-	Replace the main board.

Table 3-8. Control Panel and Switches Do Not Operate.

Cause	Check Point	Y/N	Solution
Switch is defective.	Is conductivity of the switch is OK?	NO	Replace the control panel.
Connect the control panel harness.	Control panel harness is connected properly?	NO	Connect it properly.
Control panel board is defective or the harness is defective.	-	-	Replace the control panel.

Table 3-9. Printing Operation is Abnormal When it is On-Line. (Self-Test is Normal.)

Cause	Check Point	Y/N	Solution
Initial setting is wrong.	Check the initial setting with the default setting. Is it OK?	NO	Reset the setting or use the EEPROM clear to reset setting to the default.
Interface cable is not connected properly.	Are cables connected properly?	NO	Connect them properly.
Interface cable is defective.	-	-	Replace the interface cable.
Main board is defective.	-	-	Replace the main board.
Firmware is defective.	Is the firmware version latest?	NO	Replace the firmware.

3.2.4 Unit and Parts Check

This section describes the checking method of the printhead, motors and sensors to find the defective units and parts.

When repairing the unit, make sure to turn the printer off and plug off the power cable except when this manual specifies to keep the power on.

3.2.4.1 Printhead Check

By measuring the direct current resistance of the printhead coil, you can check if it is all right.

Table 3-10. Printhead Coil Resistance

Item	Operation	Specification
Printhead	1. Set the multimeter to the resistance measuring range. 2. Connect the one side of the probe to C. 3. Connect the other side of the probe to corresponding head pin No.	33.3 ± 3.3Ω (at 25°C/phase)

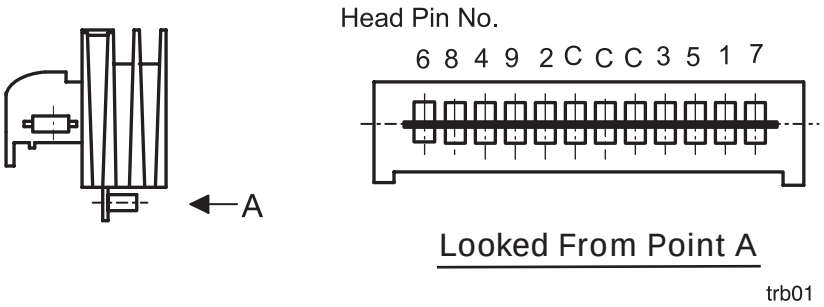


Figure 3-2. Head Coil Pin No.

3.2.4.2 Motor Check

By measuring the direct current resistance of the motor coil, you can check if the motor is all right.

Table 3-11. Motor Check

Item	Operation	Specification
CR motor	1. Set the multimeter to the resistance measuring range. 2. Connect the one side of the probe to 1 or 2 pin. 3. Connect the other side of the probe to 3 or 4 pin.	5.7Ω ±10% (at 25°C/phase)
PF motor	1. Set the multimeter to the resistance measuring range. 2. Connect the one side of the probe to 1 or 2 pin. 3. Connect the other side of the probe to 3 or 4 pin.	16.0Ω ±10% (at 25°C/phase)
CS motor (option)	1. Disassemble the CS unit. 2. Set the multimeter to the resistance measuring range. 3. Connect the one side of the probe to brown [TBD] harness. 4. Connect the other side of the probe to other 4 harness.	150Ω ± 5% (at 25°C/phase)

3.2.4.3 Sensor Check

When the sensor is connected mechanically, you can check the sensor by its conductivity.

Table 3-12. Sensor Check

Item	Operation	Specification
HP detector	1. Set the multimeter to the resistance measuring range. 2. Connect the one side of the probe to CN3 1 pin. 3. Connect the other side of the probe to CN3 2 pin.	When switching the sensor actuator, it should be switched ON/OFF.
RPE detector	1. Set the multimeter to the resistance measuring range. 2. Connect the one side of the probe to CN4 1 pin. 3. Connect the other side of the probe to CN4 2 pin.	When switching the sensor actuator, it should be switched ON/OFF.
Release detector	1. Set the multimeter to the resistance measuring range. 2. Connect the one side of the probe to CN5 1 pin. 3. Connect the other side of the probe to CN5 2 pin.	When switching the sensor actuator, it should be switched ON/OFF.
BPE detector	1. Set the multimeter to the resistance measuring range. 2. Connect the one side of the probe to CN6 1 pin. 3. Connect the other side of the probe to CN6 2 pin.	When switching the sensor actuator, it should be switched ON/OFF.
PG detector	1. Set the multimeter to the resistance measuring range. 2. Connect the one side of the probe to CN3 7 pin. 3. Connect the other side of the probe to CN3 7 pin.	When switching the sensor actuator, it should be switched ON/OFF.

3.2.4.4 Printhead Driver Check

Simple check of the printer driver (Q3 ~ Q11) can be done by the following method.

Table 3-13. Printhead Driver Check

Item	Operation	Specification
Printer driver (Q3 ～ Q11)	1. Set the multimeter to the resistance measuring range. 2. Connect the one side of the probe to the base of the transistor. 3. Connect the one side of the probe to emitter of the transistor.	The resistance should NOT be “0” or infinity.

CHAPTER

4

DISASSEMBLY AND ASSEMBLY

4.1 Overview

This chapter explains the disassembly and assembly of LQ-300+.

4.1.1 Precautions

Read the precautions below before disassembling and assembling the printer.

- **Never touch the printer right after it finishes printing, for the printhead is highly heated.**
- **Disconnect the power cable before disassembling or assembling the printer.**
- **If you need to work on the printer with power applied, strictly follow the instructions in this manual.**
- **Always wear gloves for disassembly and reassembly to avoid injury from sharp metal edges.**
- **To protect sensitive microprocessors and circuitry, use static discharge equipment, such as anti-static wrist straps, when accessing internal components.**

- **For disassembly and assembly of the printer, use the tools specified in this chapter.**
- **Use the specified oil and grease.**
- **When performing the adjustment, follow the method described in this manual.**
- **Use only recommended tools for disassembling, assembling or adjusting the printer.**
- **Observe the specified torque when tightening screws.**
- **Apply lubricants and adhesives as specified. (See Chapter 6 for details.)**
- **Make the specified adjustments when you disassemble the printer.**
  (See Chapter 5 for details.)

4.1.2 Tools

The table below lists the tools recommended to use for disassembly and assembly and adjustment. Use only tools specified here.

Table 4-1. Recommended Tools-1

Tools	Part No.
Needle-nose pliers	B740400100
Nipper	B740500100
Tweezers	B741000100
Soldering bit	B740200100
E ring holder #2.5	B740800400
+ driver No.2	B743800200
Box driver (opposite side distance: 7mm)	B741700200
Thickness gauge	B776702201

NOTE: *All tools are available in market.*

Table 4-2. Recommended Tools-2

Device	Specification
Multimeter	-
Oscilloscope	50MHz

NOTE: *Only component level repairing service requires oscilloscope.*

4.1.3 Service Checks After Repair

Before returning the printer back to the user, use the check list below to confirm the quality of the repaired printer.

Category	Component	Item to Check	Check
Printer Mechanism	Printhead	Does dot missing occur?	☐OK ☐NG
		Are any wires broken?	☐OK ☐NG
	Carriage mechanism	Does the Carriage move smoothly? ☐CR movement is not noisy? ☐CR mechanism is not dirty? ☐CR mechanism is not oily?	☐OK ☐NG
		Is the CR motor assembly at the correct temperature? (Not overheating?)	☐OK ☐NG
	Paper feed mechanism	Is paper advancing smoothly? ☐PF movement is not noisy? ☐PF mechanism is not dirty? ☐PF mechanism is not oily?	☐OK ☐NG
		Is the PF motor assembly at the correct temperature? (Not overheating?)	☐OK ☐NG
	Paper path	Are all the types of paper fed smoothly?	☐OK ☐NG
		Does the tractor feed paper smoothly?	☐OK ☐NG
		Is the paper path clear of obstructions?	☐OK ☐NG
		Is the platen free of damage?	☐OK ☐NG
	Ribbon mask	Is the ribbon mask free of distortion?	☐OK ☐NG
	Test printing	Is the test printing successful?	☐OK ☐NG
	Online printing	Is the online printing successful?	☐OK ☐NG
Adjustment	Printhead	Is the platen gap adjusted correctly?	☐OK ☐NG
		Is Bi-d adjustment value correct?	☐OK ☐NG
	Initial setting	Have all user changeable settings been reset to the default value?	☐OK ☐NG
Version Up	ROM version	Latest ROM version _____	☐OK ☐NG
Transportation	Ink ribbon	Is ribbon removed?	☐OK ☐NG
	accessories	Are all the relevant parts included in the shipment?	☐OK ☐NG

4.2 Disassembly and Assembly

This section explains the disassembly and assembly of Product Name. Unless otherwise specified, assembly can be done in the reverse order of the disassembly procedure.

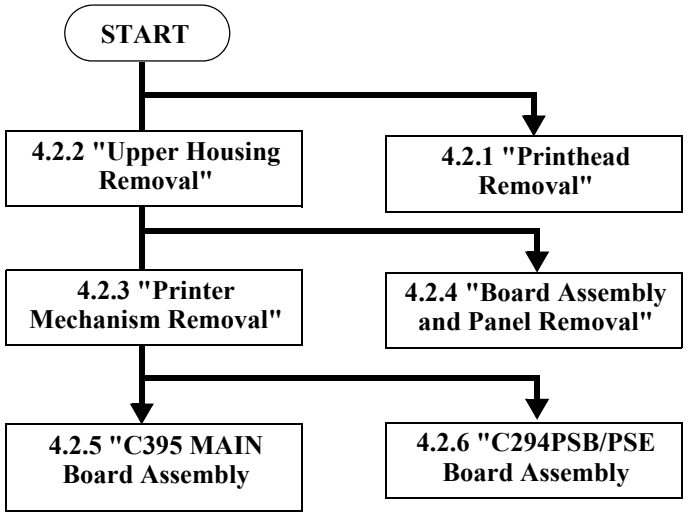
Anything that service person should pay attention to is described under “Check Point”. Any adjustment required after assembly is described under “Adjustment”.

When you have to remove parts that are not described in this chapter, refer to the exploded diagram on Appendix of this manual.

CAUTION

- **Read 4.1.1 "Precautions" before start disassembling the printer.**
- **Remove ink ribbon and paper before disassembling the printer.**

The figure below is the disassembly flowchart for main component.



Flowchart 4-1. Disassembly Flowchart (Main Component)

4.2.1 Printhead Removal

1. Remove the cover and the printer.
2. Remove 1 screw (CBP, 3x14, Torque:0.59-0.78N.M) securing the printhead to the carriage assembly.
3. Lift the printhead a little bit. Unlatch 2 hooks securing the printhead FFC to carriage unit.
4. Remove FFC from the printhead.

Check if the printer is powered off before removing the printhead.

When the printhead is replaced, perform the platen gap adjustment.

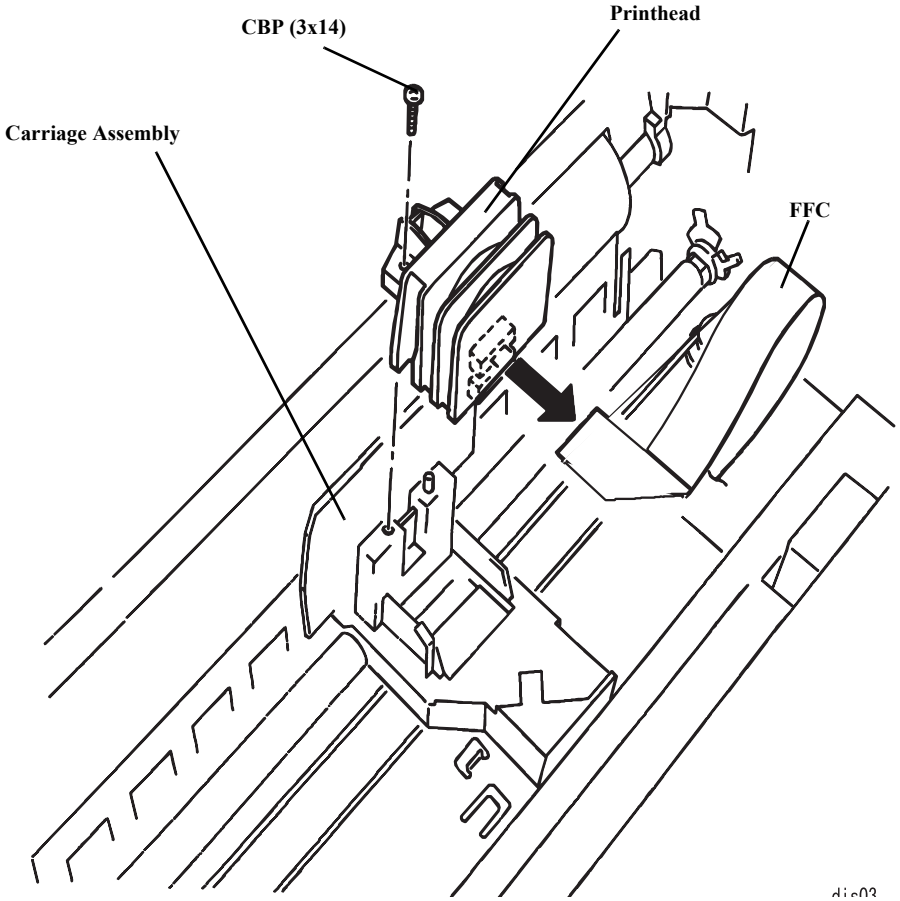


Figure 4-1. Printhead Removal

4.2.2 Upper Housing Removal

1. Remove platen knob, cover assembly, printer, tractor unit and paper eject unit. Remove the color upgrade kit if it is installed.
2. Set the release lever to the tractor feed.
3. Remove 4 screws (CBP, 3x10, Torque: 0.78-0.98N.M) securing the upper housing to the lower housing.
4. Remove the upper housing.

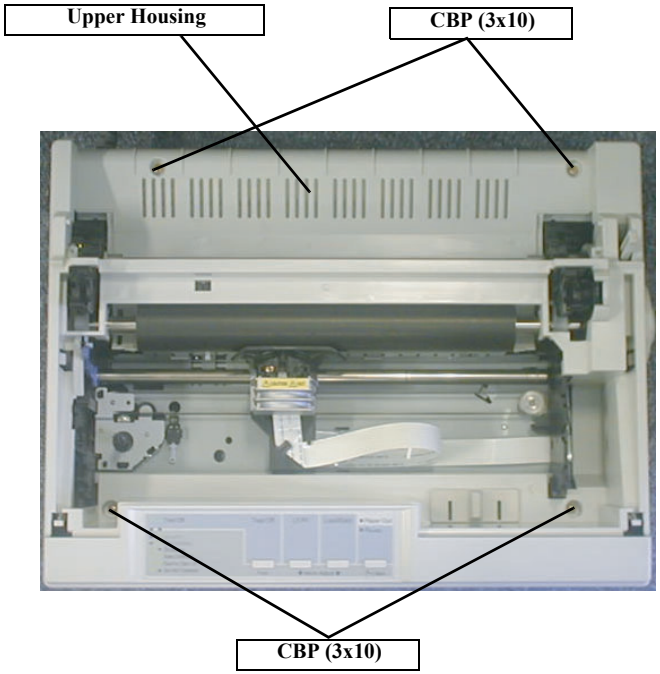
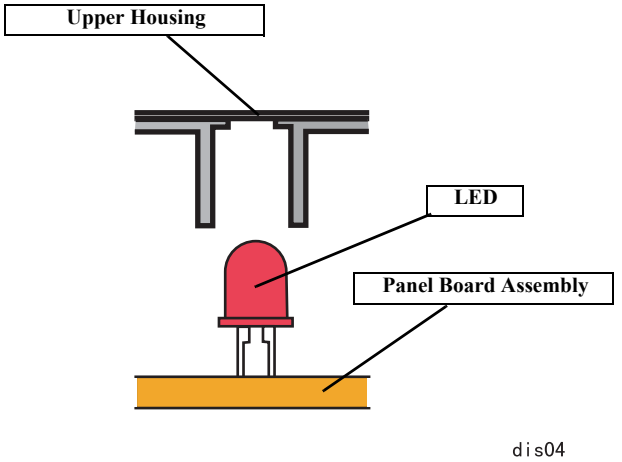


Figure 4-2. Upper Housing Removal

CHECK POINT

When installing the upper housing, be sure to insert LEDs on the panel board to the LED holes of the upper housing.



4.2.3 Printer Mechanism Removal

1. Remove the upper housing. (See 4.2.2 "Upper Housing Removal".)
2. Remove 3 screws (CBP, 3x10,Torque: 0.78-0.98N.M) and (CBS, 3x4, Torque: 0.78-0.98N.M) securing the upper shield plate to the lower housing. Remove the shield cover.

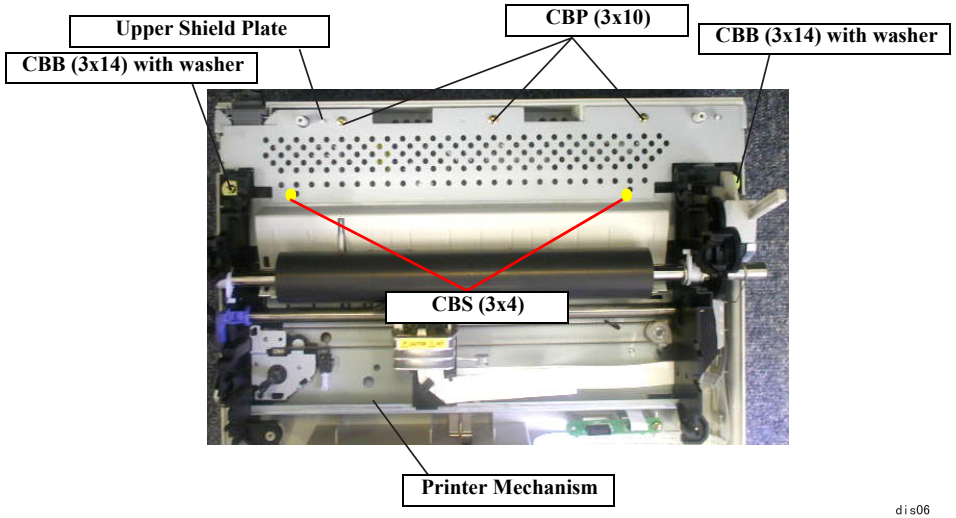


Figure 4-3. Upper Shield Plate

3. Remove 2 screws with washer (CBP, 3x14) securing the printer mechanism to the lower housing.
4. Lift the printer mechanism a little bit and remove harnesses from the main board assembly.

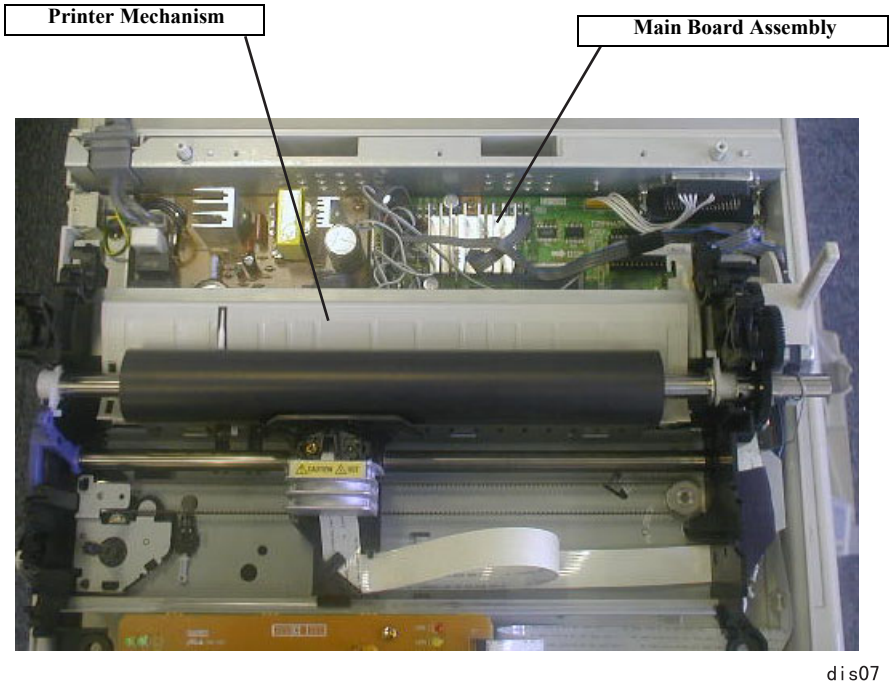


Figure 4-4. Harness Removal

5. Remove the printer mechanism.

ADJUSTMENT REQUIRED

Perform Bi-D adjustment after removing the printer mechanism.

4.2.4 Board Assembly and Panel Removal

1. Remove the upper housing. (See 4.2.2 "Upper Housing Removal".)
2. Remove the panel FFC from the connector of panel board assembly.
3. Remove 3 screws (CBP, 3x10, Torque: 0.78-0.98N.M) securing the panel board assembly to the lower housing.
4. Remove the panel board assembly from the lower housing.

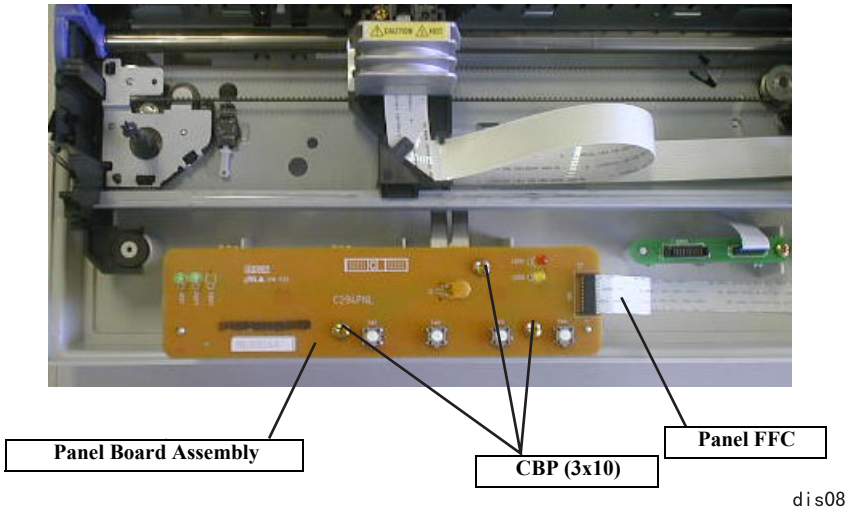


Figure 4-5. Board Assembly and Panel Removal

4.2.5 C395 MAIN Board Assembly Removal

1. Remove the upper housing. (See 4.2.2 "Upper Housing Removal".)
2. Remove the printer mechanism. (See 4.2.3 "Printer Mechanism Removal".)
3. Remove 2 hexagon nuts securing the serial interface connector to the lower shield plate.
4. Remove the serial interface connector from the installation hole of the lower shield plate.
5. Remove 2 screws (CP, 3x4, Torque: 0.48-0.78N.M) securing the parallel interface to the lower shield plate.
6. Remove the option FFC and panel FFC from CN12 and CN13 on the board.
7. Remove the harness from the P/S board assembly from CN8.
8. Remove 3 screws (CBP, 3x10, Torque: 0.78-0.98N.M) securing the main board assembly to the lower housing.

ADJUSTMENT REQUIRED

When the main board assembly is replaced, perform destination setting and Bi-D adjustment.

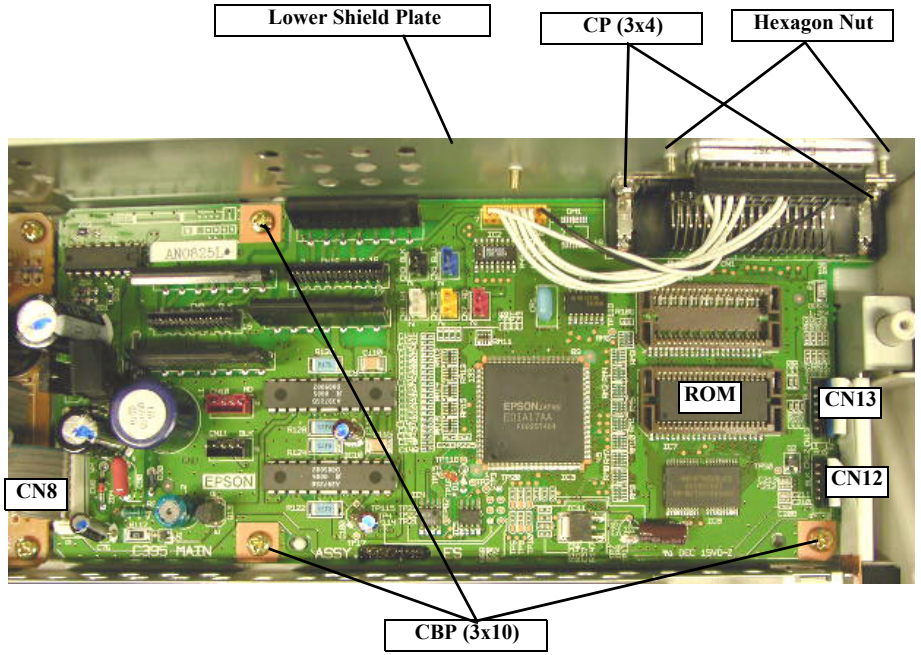


Figure 4-6. C395MAIN Board Assembly Removal

4.2.6 C294PSB/PSE Board Assembly Removal

1. Remove the upper housing. (See 4.2.2 "Upper Housing Removal".)
2. Remove the printer mechanism. (See 4.2.3 "Printer Mechanism Removal".)
3. Remove the power cable (CN1) connecting to the Power Supply board assembly.
4. Remove the power switch from the lower housing.
5. Remove the harness connecting the Power Supply board assembly to the main board assembly. (CN8 of the main board assembly)
6. Remove 4 screws (CBP, 3x10, Torque: 0.78-0.98N.M) securing the Power Supply board assembly to the lower housing.
7. Remove the Power Supply board assembly.

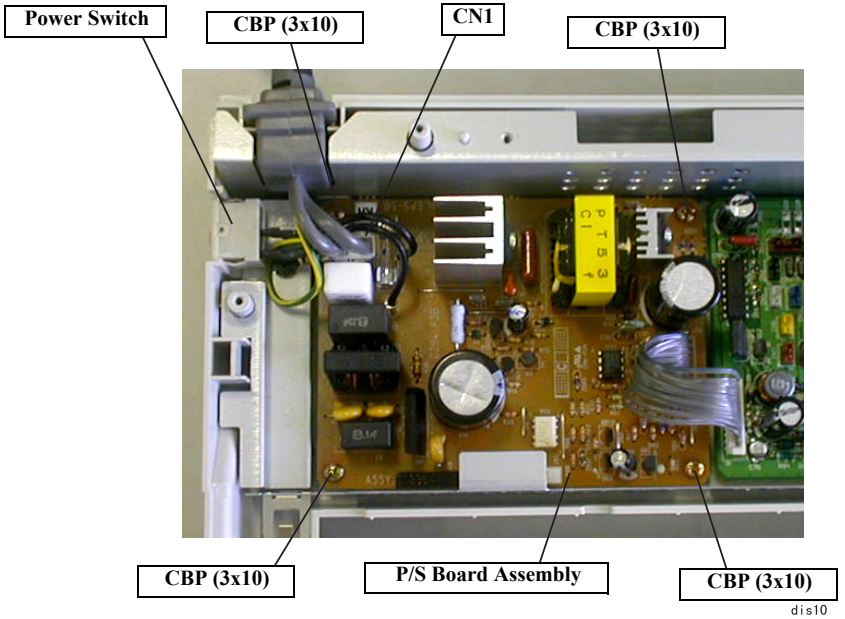


Figure 4-7. C294PSB/PSB Board Assembly Removal

4.2.7 Printer Mechanism Disassembly

This section explains the disassembling procedure of the printer mechanism. The disassembling procedure is shown in the flowchart below.

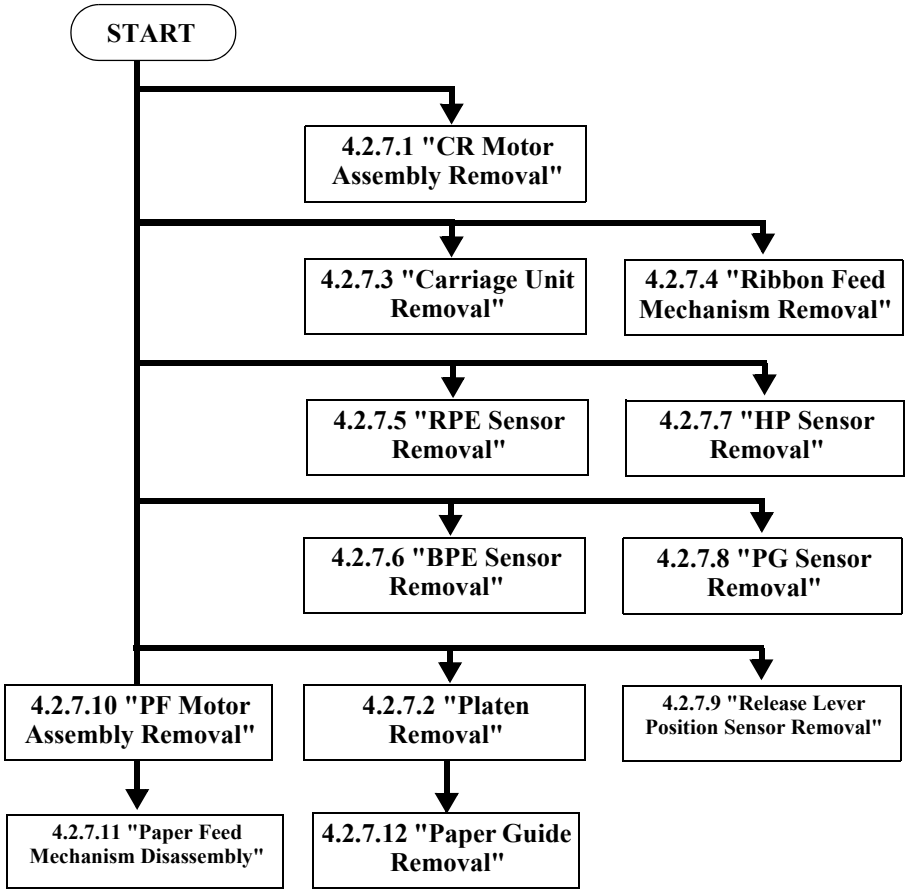

START
4.2.7.1 "CR Motor Assembly Removal"
4.2.7.3 "Carriage Unit Removal"
4.2.7.4 "Ribbon Feed Mechanism Removal"
4.2.7.5 "RPE Sensor Removal"
4.2.7.7 "HP Sensor Removal"
4.2.7.6 "BPE Sensor Removal"
4.2.7.8 "PG Sensor Removal"
4.2.7.10 "PF Motor Assembly Removal"
4.2.7.2 "Platen Removal"
4.2.7.9 "Release Lever Position Sensor Removal"
4.2.7.11 "Paper Feed Mechanism Disassembly"
4.2.7.12 "Paper Guide Removal"

Figure 4-8. Printer Mechanism Disassembling Procedure

4.2.7.1 CR Motor Assembly Removal

1. Remove the printer mechanism. (See 4.2.3 "Printer Mechanism Removal".)
2. Remove the tension spring, 8.10 and motor bracket and release the tension of the timing belt.
3. Remove the timing belt from the pulley of the CR motor assembly.
4. Rotate the CR motor assembly with the motor bracket clockwise to remove it.

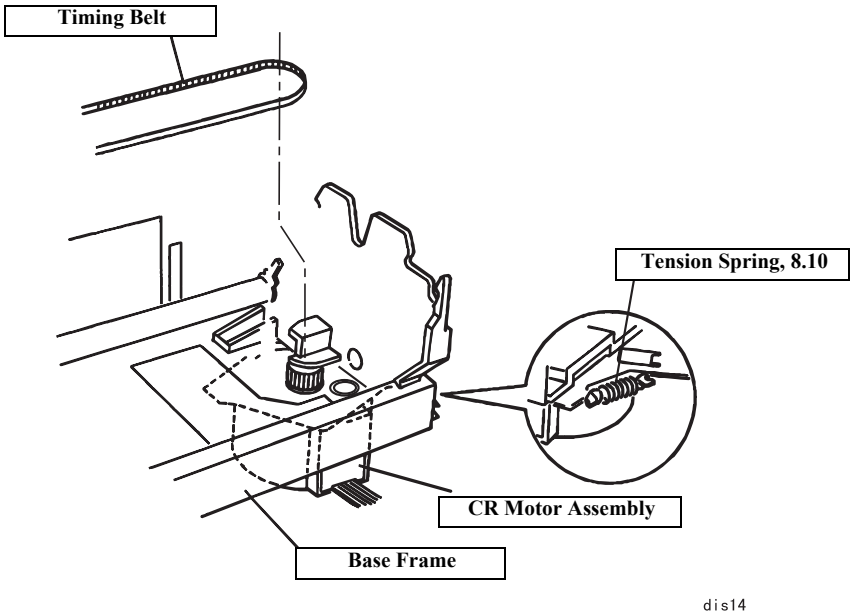


Figure 4-9. CR Motor Assembly Removal

When the CR motor assembly is replaced, perform Bi-D adjustment.

4.2.7.2 Platen Removal

1. Remove the printer mechanism. (See 4.2.3 "Printer Mechanism Removal".)
2. Remove the platen grounding wire from the platen.
3. Release 1 hook at the rotating hole of the combination gear 17.5, 27 and remove the gear from the right frame.

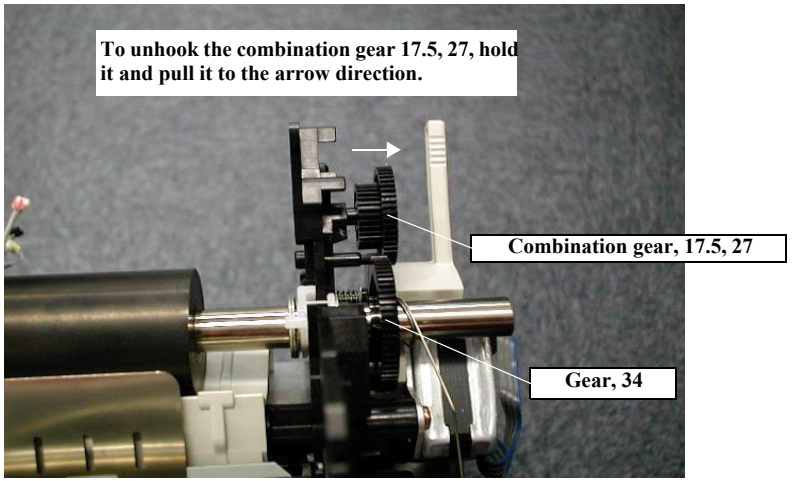


Figure 4-10. Hook at the Combination Gear 17.5, 27

4. Rotate right and left bushing, 11 and remove them off from the right / left frame.
5. Remove the platen.

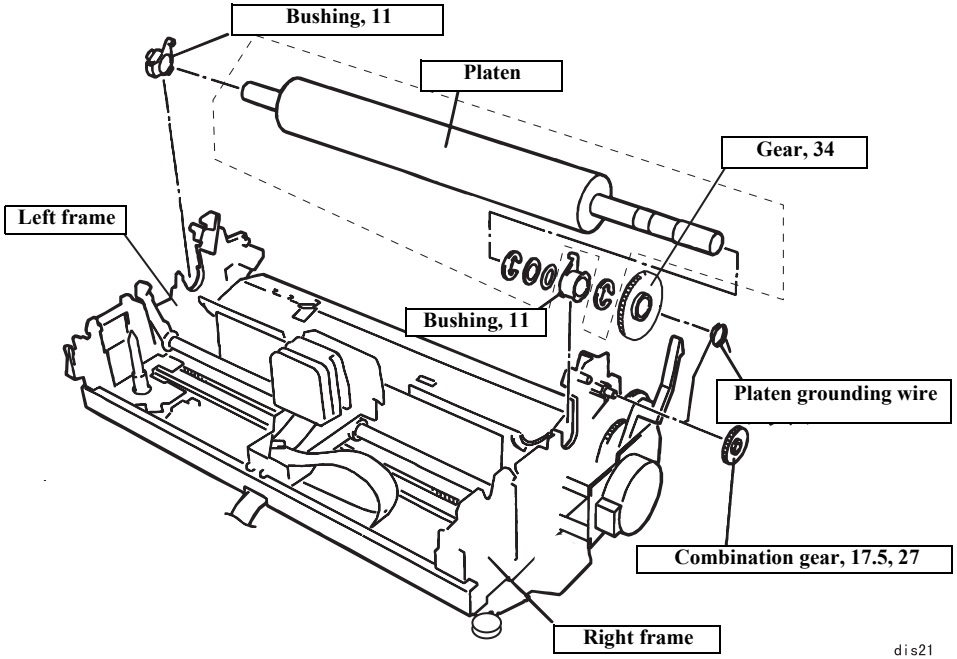


Figure 4-11. Platen Removal

4.2.7.3 Carriage Unit Removal

1. Remove the printer mechanism. (See 4.2.3 "Printer Mechanism Removal".)
2. Remove the printhead. (See 4.2.1 "Printhead Removal".)
3. Remove the timing belt from the carriage installation point.

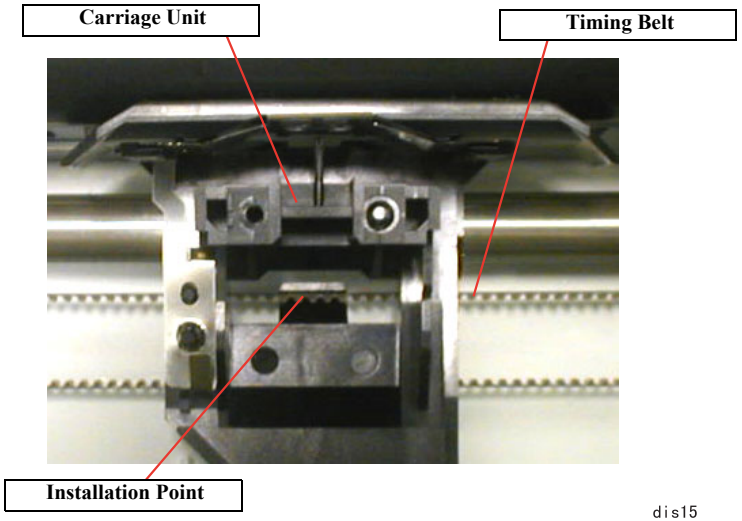


Figure 4-12. Timing Belt Removal

4. Remove the CR shaft grounding plate from the base frame on the left side of the printer.

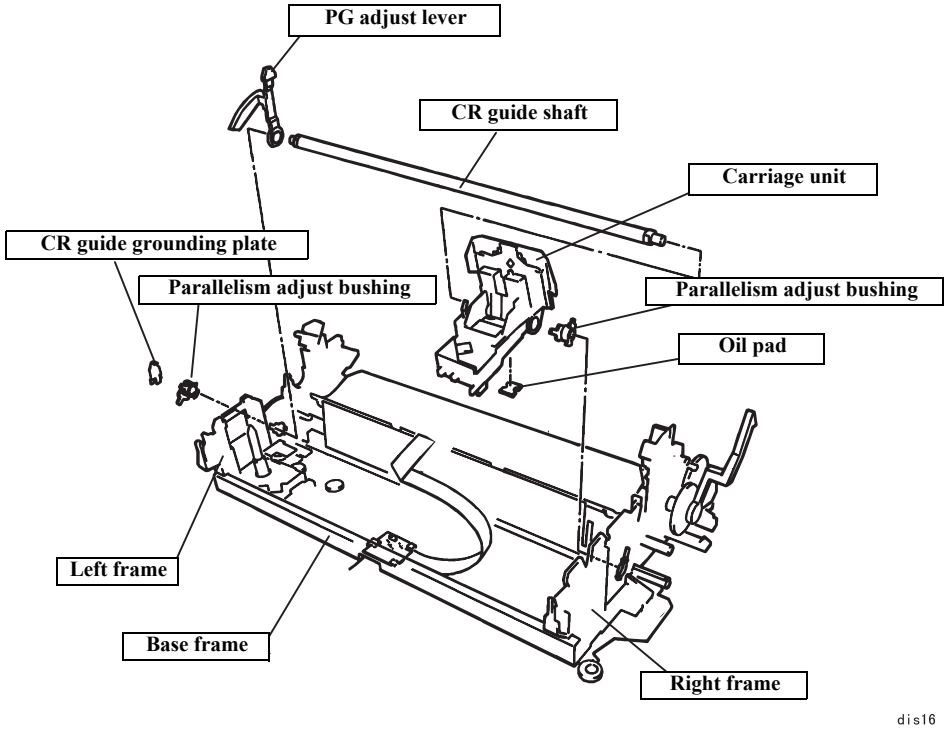


Figure 4-13. Carriage Unit Removal

5. Rotate the right and left parallelism adjust bushing and remove them from respective frame.
6. Release the PG adjust lever hook, connecting to the left frame.

Figure 4-14. Hook at the PG Adjust Lever

7. Remove the carriage unit along with the CR guide shaft and PG adjust lever from the printer mechanism.

ADJUSTMENT REQUIRED

When the carriage unit is replaced, perform Bi-D adjustment.

4.2.7.4 Ribbon Feed Mechanism Removal

1. Remove the printer mechanism. (See 4.2.3 "Printer Mechanism Removal".)
2. Remove the tension spring, 8.10 from the motor bracket and release the tension of the timing belt. (See 4.2.7.1 "CR Motor Assembly Removal".)
3. Release 3 hooks securing the RD cover to the left frame.
4. Remove the RD cover.

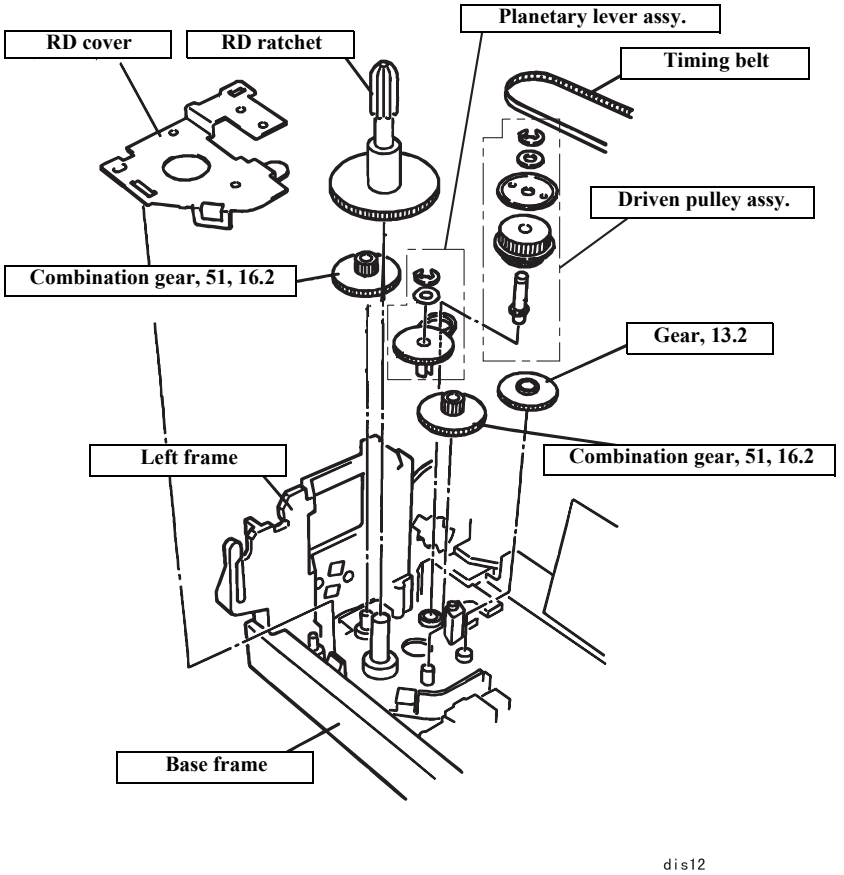


Figure 4-15. Ribbon Feed Mechanism Removal

4.2.7.5 RPE Sensor Removal

1. Remove the printer mechanism. (See 4.2.3 "Printer Mechanism Removal".)
2. Remove the hook of the RPE sensor installed at the paper guide.
3. Remove RPE sensor.
4. Remove the harness from the RPE sensor (white).

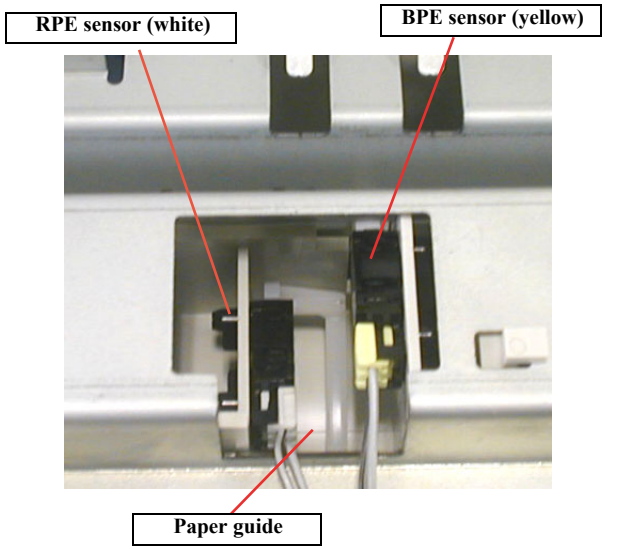


Figure 4-16. RPE/BPE Sensor Removal

4.2.7.6 BPE Sensor Removal

1. Remove the printer mechanism. (See 4.2.3 "Printer Mechanism Removal".)
2. Remove the hook of the BPE sensor installed at the paper guide.
3. Remove BPE sensor.
4. Remove the harness from the BPE sensor (yellow).

4.2.7.7 HP Sensor Removal

1. Remove the printer mechanism. (See 4.2.3 "Printer Mechanism Removal".)
2. Release 2 hooks of the HP sensor securing it to the base frame with tweezers and remove the sensor.
3. Remove the harness from the sensor (black).

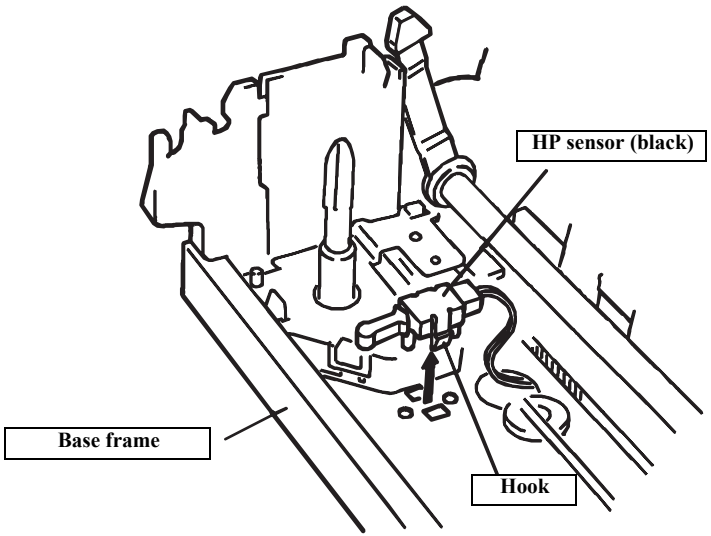


Figure 4-17. HP Sensor Removal

4.2.7.8 PG Sensor Removal

1. Remove the printer mechanism. (See 4.2.3 "Printer Mechanism Removal".)
2. Release 2 hooks of the PG sensor securing it to the left frame with tweezers and remove the sensor.
3. Remove the harness from the sensor (white).

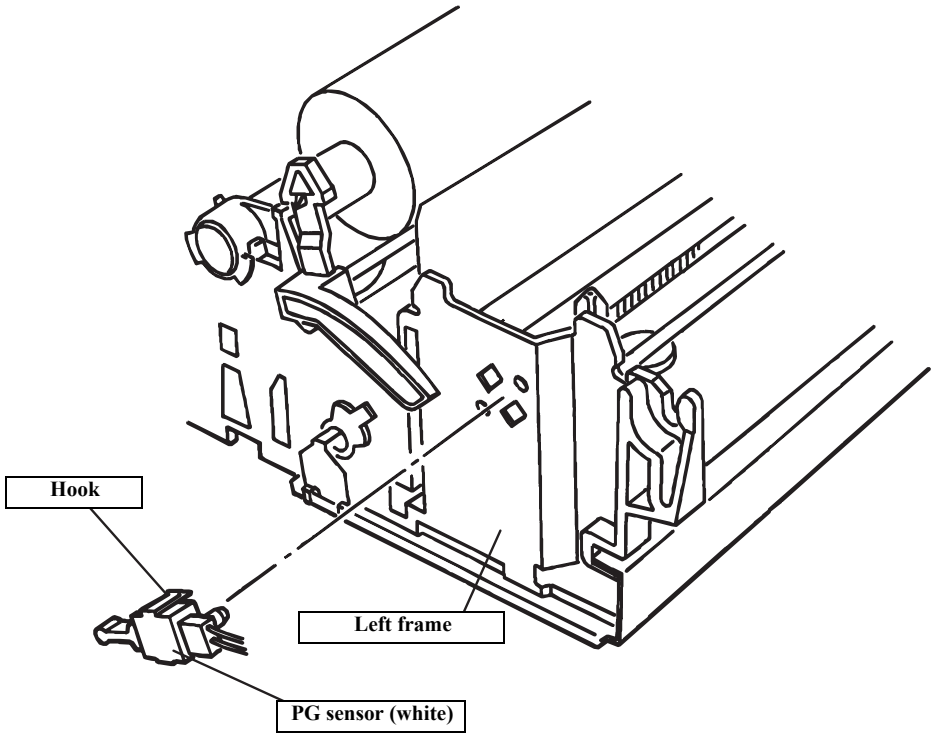


Figure 4-18. PG Sensor Removal

4.2.7.9 Release Lever Position Sensor Removal

1. Remove the printer mechanism. (See 4.2.3 "Printer Mechanism Removal".)
2. Release 2 hooks of the release lever position sensor securing it to the right frame with tweezers and remove the sensor.
3. Remove the harness from the sensor (blue).

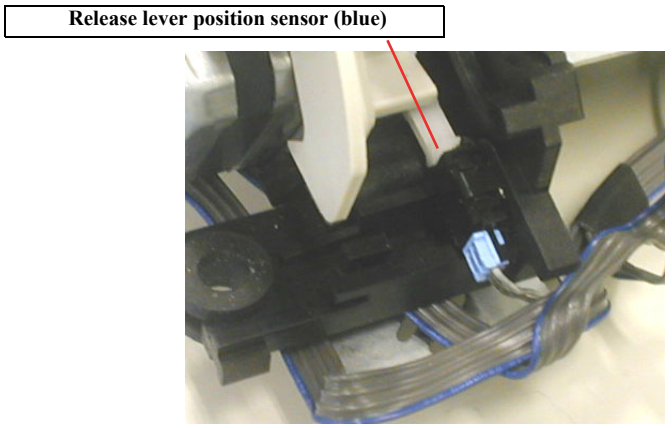


Figure 4-19. Release Lever Position Sensor Removal

CAUTION

When installing the release lever position sensor, be sure to insert it between the release lever and the right frame.

4.2.7.10 PF Motor Assembly Removal

1. Remove the printer mechanism. (See 4.2.3 "Printer Mechanism Removal".)
2. Remove the platen grounding wire from the platen.
3. Remove 1 screw (CBP, 3x10, Torque:0.59-0.78N.M) securing the PF motor assembly to the right frame.
4. Remove 1 hook at the right frame securing the PF motor assembly to the right frame and remove the PF motor assembly.

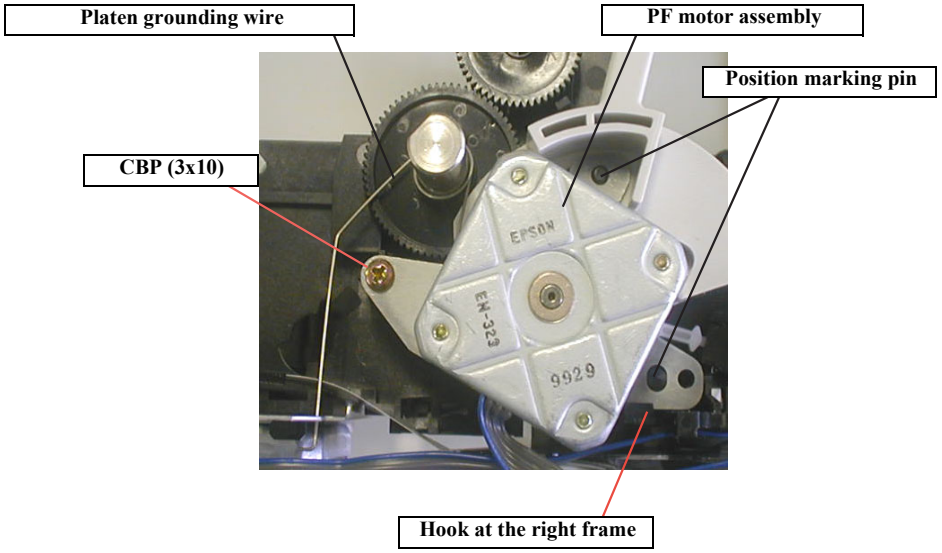


Figure 4-20. PF Motor Assembly Removal

CHECK POINT

When installing the PF motor assembly to the right frame, be careful to align the position marking pin and motor bracket position marking hole.

4.2.7.11 Paper Feed Mechanism Disassembly

1. Remove the printer mechanism. (See 4.2.3 "Printer Mechanism Removal".)
2. Remove the PF motor assembly. (See 4.2.7.10 "PF Motor Assembly Removal".)
3. Remove the release lever.

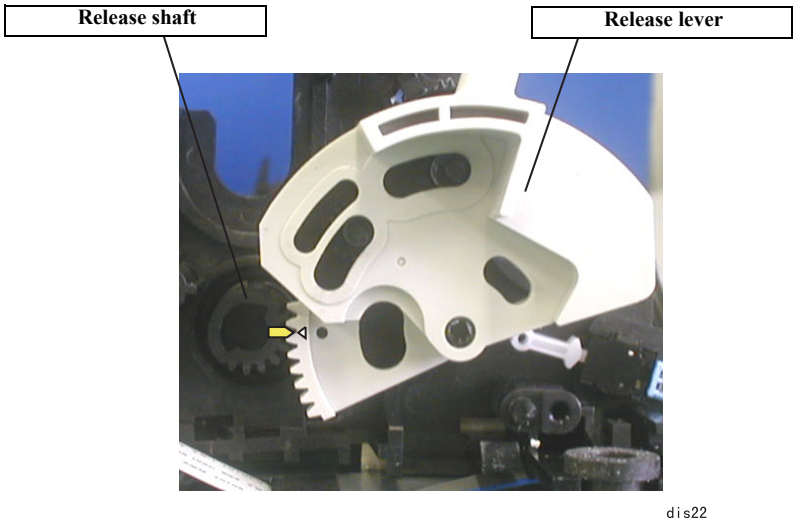


Figure 4-21. Release Lever Removal

CHECK POINT

When installing the release lever, be sure to align the marking on the release lever with the marking on the release shaft.

4. Release the hook of the right frame securing the gear, 27.5 and remove the gear, plain washer 5.2x0.3x10 and the compression spring, 1.18.

5. Remove the combination gear, 8.5, 25.2 from the right frame.

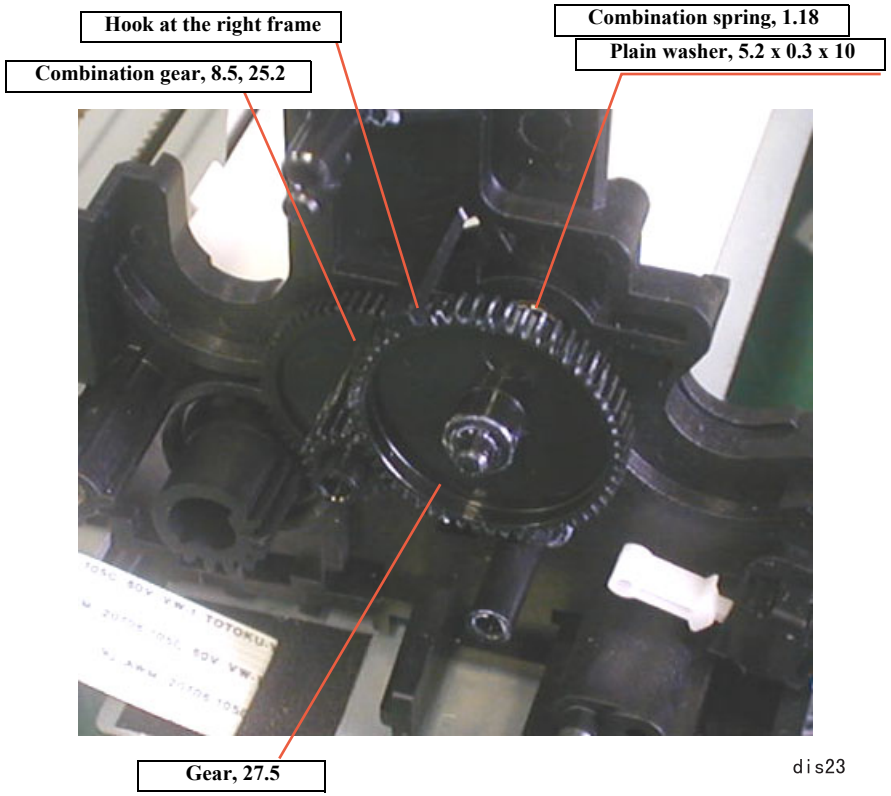


Figure 4-22. Paper Feed Mechanism Disassembly

4.2.7.12 Paper Guide Removal

1. Remove the printer mechanism. (See 4.2.3 "Printer Mechanism Removal".)
2. Remove the platen. (See 4.2.7.2 "Platen Removal".)
3. Remove the carriage unit. (See 4.2.7.3 "Carriage Unit Removal".)
4. Remove the HP sensor. (See 4.2.7.7 "HP Sensor Removal".)
5. Remove the PG sensor. (See 4.2.7.8 "PG Sensor Removal".)
6. Remove the PF motor assembly and release lever. (See 4.2.7.10 "PF Motor Assembly Removal".)
7. Release 1 hook securing the paper guide to the bottom of the paper guide to the lower paper guide, pull the paper guide to the rear and remove it.

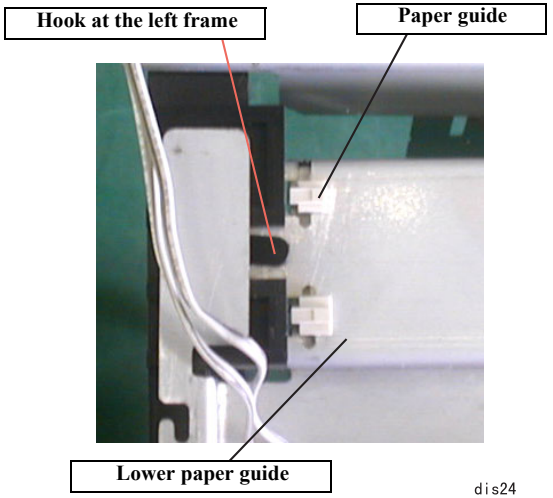


Figure 4-23. Lower Paper Guide Removal

8. Release 1 hook at the left frame securing the base frame and remove it by pulling it to the rear.

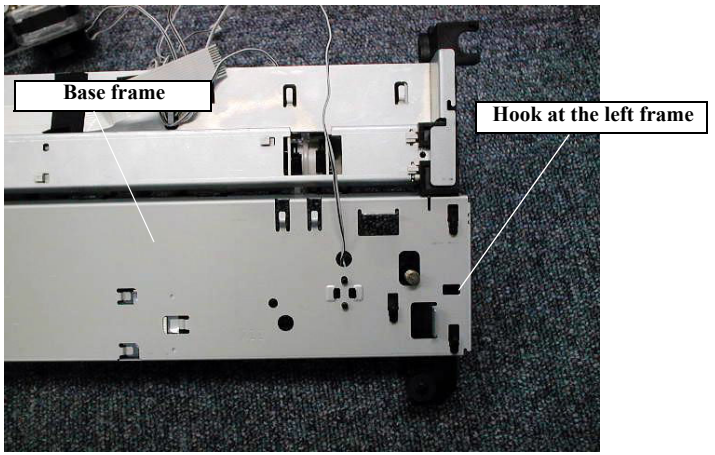


Figure 4-24. Left Frame Removal

9. Release 1 hook securing the paper guide to the lower paper guide and remove the paper guide along with the release shaft by pulling it to the left.

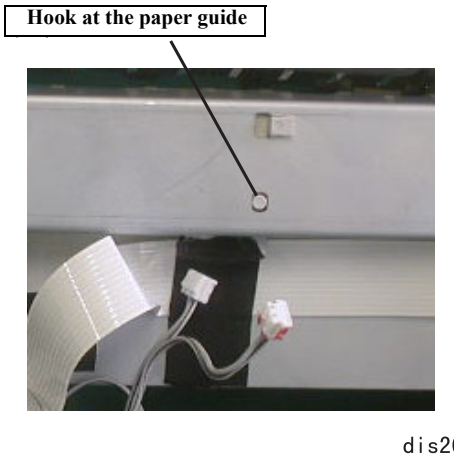


Figure 4-25. Lower Paper Guide

CHAPTER

5

ADJUSTMENT

5.1 Overview

This chapter explains the adjustment required after disassembling the printer.

5.1.1 Platen Gap Adjustment

Platen gap adjustment is required at the following cases.

- ☐ Printhead is replaced.
- ☐ Carriage is replaced.
- ☐ CR guide shaft is removed.
- ☐ Parallelism adjust bushing is removed.
- ☐ Printing is too thin.
- ☐ Ink ribbon often gets jammed.

Follow the steps below before performing the platen gap adjustment.

1. Remove the upper housing. (Refer to Ch4.)
2. Set the PG adjust lever to “0”.
3. Remove the printhead and remove the ribbon mask.
4. Re-install the printhead.
5. Follow the procedure in the flowchart below for the adjustment.

Table 5-1.

Platen Gap Setting	Judging Method
0455 ± 0.015mm (TBD)	Thickness gauge 0.44mm falls down by its own weight: O Thickness gauge 0.47mm does NOT fall down by its own weight: X

Table 5-2.

Rotational direction of the parallelism adjust bushing	Platen gap
Platen side	Widen
Front side	Narrowed

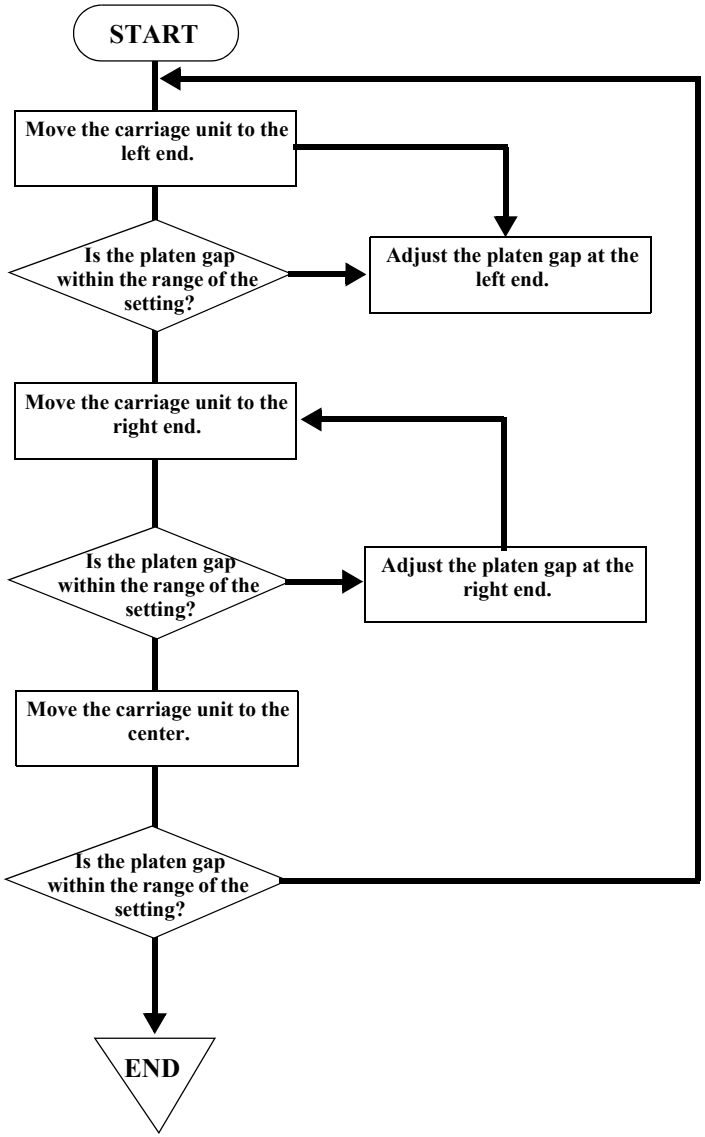

START
Move the carriage unit to the left end.
Is the platen gap within the range of the setting?
Adjust the platen gap at the left end.
Move the carriage unit to the right end.
Is the platen gap within the range of the setting?
Adjust the platen gap at the right end.
Move the carriage unit to the center.
Is the platen gap within the range of the setting?
END

Figure 5-1. Platen Gap Adjustment

5.1.2 Bi-D Adjustment

Bi-D adjustment is required at the following cases.

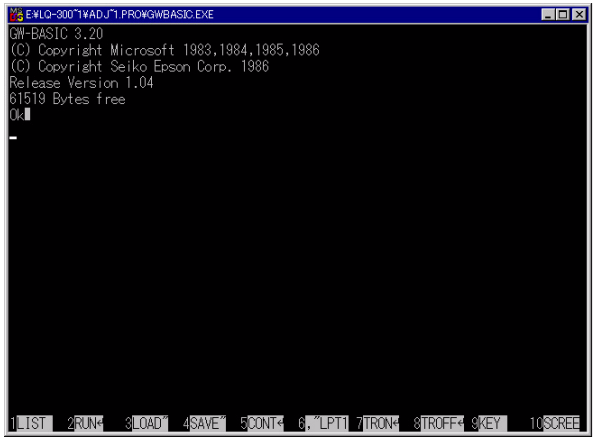
- ☐ Main board assembly is replaced.
- ☐ Printer mechanism is replaced.
- ☐ Printer mechanism is removed.

Follow the caution items below, and then, perform the steps for the platen gap adjustment.

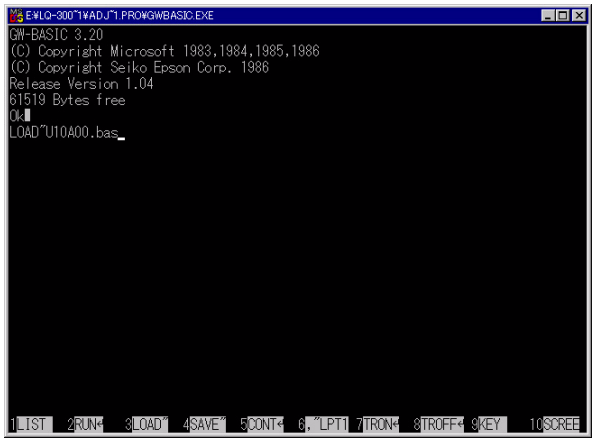
CAUTION

- **This test program used here is originally the program used for production line. Therefore, operations that are not described in this manual are forbidden to use.**
- **The adjusted value will not be stored to EEPROM on the main board until the printer is turned off.**
- **Clear EEPROM by the panel operation does not clear Bi-D setting.**
- **Since Uni-direction is compulsory set, make sure to set the first page of FF paper, and then, start Bi-D pattern.**

1. Connect the printer and the host computer by parallel interface cable.
2. Turn on the PC and the printer.
3. Set FF paper to the printer.
4. Insert FD that contains the adjustment program and click “Gwbasic.exe” in the disk to execute GWBASIC. The following DOS prompt screen appears.



5. Press F3 or input “Load,” and “U10A00V.bas”. Press ENTER.



6. After appearing OK, press F2 or input “Run”.
7. The program will ask you the production line No. Ignore it and press ENTER.
8. The model selection screen appears. By using ↑ or ↓ key to shift the“>” mark, select the model name, “LQ-300+ “and press ENTER.

E:¥LQ-300ﾌ¥ADJﾌ1.PRO¥GWBASIC.EXE
Program:U10A00V Setting:
VR 0 = 0 VR 1 = 0 VR 2 = 0
** **
[Printer select]
(1)---- N/A ----
>(2)LQ-300+
(3)LX-1170
(4)---- N/A ----
1load ﾌ 2lprint 3ESC↵ 4edit 5run↵ 6system 7TRON↵ 8TROFF↵ 9KEY 10SCREE

9. The destination setting menu appears. Referring to the table below and using ↑ or ↓ key to shift the“>” mark,choose an appropriate setting and press ENTER.

Table 5-3. Destination Setting

Destination	Setting
EUR NLSP	NLSP
EUL NLSP (220V)	NLSP
Conti NLSP	NLSP
EUL NLSP(240V)	NLSP
EUL 120V	DEFSTD
ESP (Std)	USASTD
ESP (Inter)	USASTD
ESP Thai	DEFSTD
ESP (Phil)	USASTD
EAL	USASTD

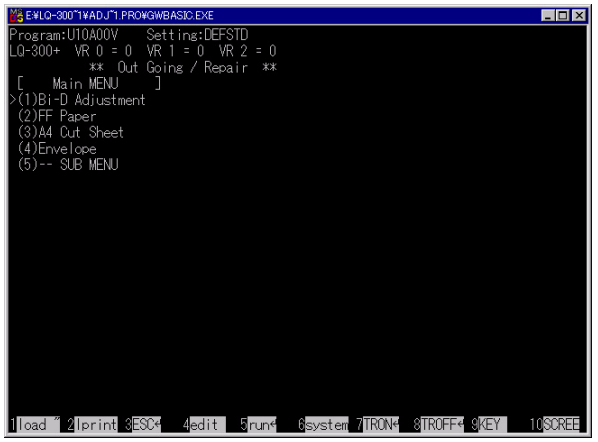
Table 5-3. Destination Setting

Destination	Setting
EHK	USASTD
ETT	USASTD
ECC(Kver)	DEFSTD

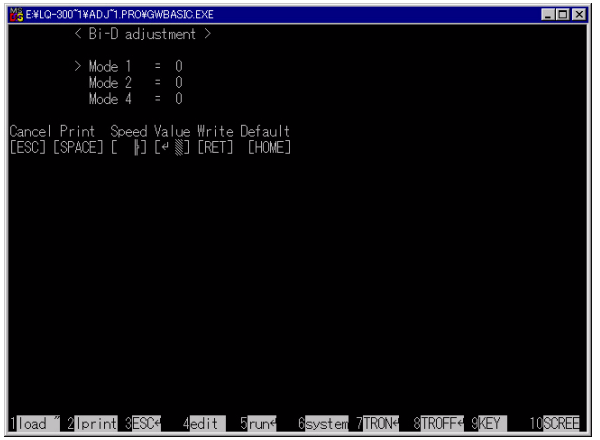
10. The following screen appears. By using ↑ or ↓ key to shift ">" mark, select "Out Going" and press ENTER.

E:¥LQ-300~1¥ADJ~1.PRO¥GWBASIC.EXE
Program:U10A00V Setting:DEFSTD
LQ-300+ VR 0 = 0 VR 1 = 0 VR 2 = 0
** **
[Process select]
(1) In Line
>(2) Out Going / Repair
1load ~ 2lprint 3ESC↵ 4edit 5run↵ 6system 7TRON↵ 8TROFF↵ 9KEY 10SCREE

11. "Main MENU" appears. By using ↑ or ↓ key to shift ">" mark, select "(1) Bi-D Adjust" and press ENTER.


E:¥LQ-300~1¥ADJ~1.PRO¥GWBASIC.EXE
Program:U10A00V Setting:DEFSTD
LQ-300+ VR 0 = 0 VR 1 = 0 VR 2 = 0
** Out Going / Repair **
[Main MENU]
>(1)Bi-D Adjustment
(2)FF Paper
(3)A4 Cut Sheet
(4)Envelope
(5)-- SUB MENU
1load ~ 2lprint 3ESC↵ 4edit 5run↵ 6system 7TRON↵ 8TROFF↵ 9KEY 10SCREE

12. The printing mode select menu for Bi-D adjustment appears. Use ↑ or ↓ key to select the printing mode "Mode 1"and use ← or → key to change Bi-D values. After selecting them, press SPACE. Bi-D Printing starts.


E:¥LQ-300~1¥ADJ~1.PRO¥GWBASIC.EXE
< Bi-D adjustment >
> Mode 1 = 0
Mode 2 = 0
Mode 4 = 0
Cancel Print Speed Value Write Default
[ESC] [SPACE] [ ] [↵] [RET] [HOME]
1load ~ 2lprint 3ESC↵ 4edit 5run↵ 6system 7TRON↵ 8TROFF↵ 9KEY 10SCREE

NOTE: *Mode 1: Normal Draft*
Mode 2: Bit Image 90 dpi
Mode 4: LQ

13. Four rows of Bi-D pattern will be printed as follows. If four lines are not straight vertically, change the values and press SPACE to reprint Bi-D pattern. Continue this procedure until the gaps of Bi-D lines become less than 0.25 mm.

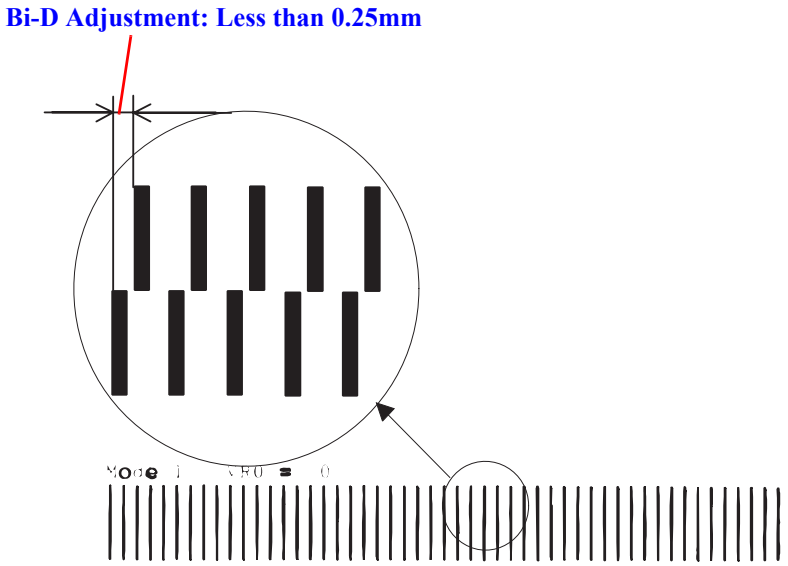


Figure 5-2. Bi-D Adjustment

14. After adjustment of Mode 1 is completed, repeat the same procedure for Mode 2 and Mode 4.
15. To exit this adjustment program, press ESC several times until OK shows up on the screen. When OK appears, input “system” and press ENTER. Then, turn off the printer.

CHAPTER

6

MAINTENANCE

6.1 Maintenance

Appropriate maintenance is necessary to keep the printer in the best condition and prevent from troubles.

6.1.1 Cleaning

Use neutral detergent or diluted alcohol to clean the dirt on the outside. Vacuum dust or a small piece of papers inside the printer.

- **When performing the maintenance, remove the AC cable from the AC socket.**
- **Never touch the printhead right after printing, as it is highly heated.**

- **Never use thinner, tricren, or ketone solvent, as it may deform or deteriorate the plastic parts or rubber parts.**
- **Use the specified amount of the specified oil.**

6.1.2 Lubrication

Lubrication poinsts of LQ-300+ are as shown in the following table. Refer to the table for types and amount of oil to be used for each point. Oil and grease have a great affect on performance of the product, especially on the durability and the performance at the lower temperature. EPSON determines what kind of and how much of oil to be applied based on various information and analysis.

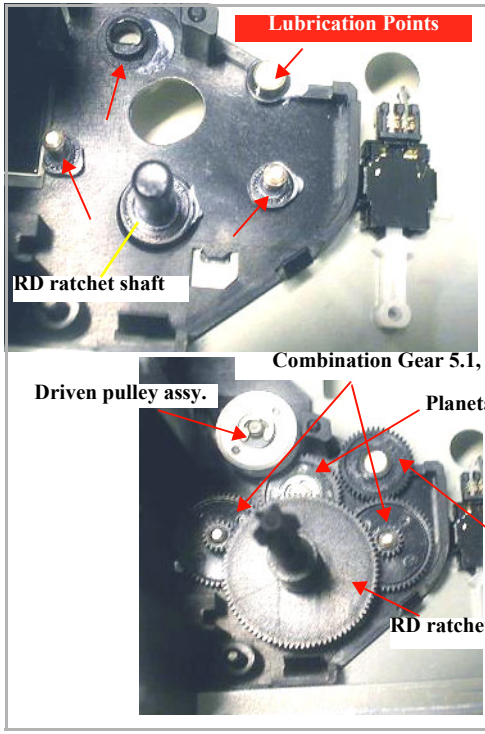
Table 6-1. Grease and Oil Amount

Type	Name	Quantity	Availability	Part No.
Grease	G-26	40g	EPSON	B702600001
Oil	O-2	40cc	EPSON	B710200001

Table 6-2. Lubrication Points

Fig.	Lubrication Points	Lubricant	Quantity
6-1	3 shafts and 2 bosses of the left frame	G-26	1/2 grain of rice
	Shaft of RD ratchet	G-26	1 grain of rice
6-2	Teeth of Gears at the left frame	G-26	1/2 grain of rice
6-3	3 places on the 3 shafts of the right frame	G-26	1 grain of rice
6-4	2 places on inside of cam at slope surface of the release lever	G-26	1 grain of rice
6-5	Shaft of the PF roller drive and the rear driven PF roller.	G-26	1/2 grain of rice
6-6	Paper guide from the back side at 4 places	G-26	1 grain of rice
6-7	Lubricate G26 on the surface of Drive Tractor Shaft.	G-26	1/2 grain of rice
6-8	Oil pad	O-2	0.28-0.32cc
6-9	Touching parts of the 2 sides of the base frame.	G-26	40mm x 2 places
6-10	2 touching position with the CR motor assembly from the inside of the base frame.	G-26	1/2 grain of rice x 2
6-11	Installing shaft of the combination gear, 17.5, 27 of the right frame.	G-26	1/2 grain of rice
6-12	Touching position of the grounding platen spring with platen shaft.	G-26	1 grain of rice
	Spur gear 34	G-26	10mm

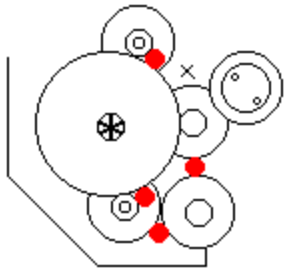
NOTE: *Lubrication must be applied during the re-assembly process. For lubrication points, refer to the following figures.*



Lubricate G-26 on the 3 shafts and 1 boss of the left frame.
G-26, 1/2 of rice

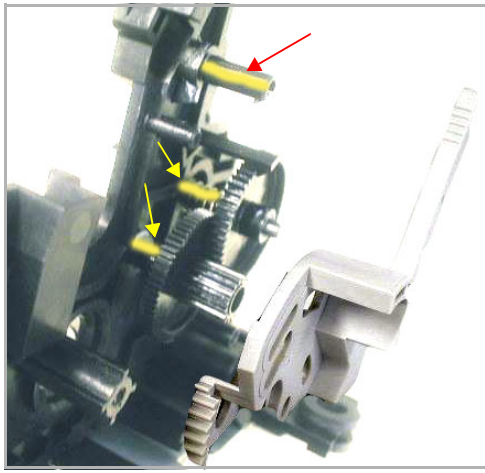
Lubricate G-26 on the shaft of the left frame.
G-26, 1 of rice

Figure 6-1. Left Frame Assembly



Lubricate G-26 on teeth of gears.
G-26, 1/2 of rice

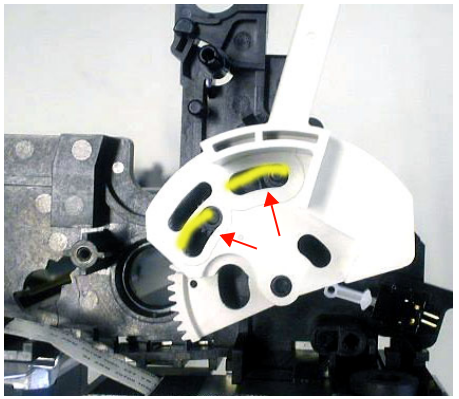
Figure 6-2. Teeth of Gears at the Left Frame



Lubricate G-26 at 3 places on 3 shafts a the right frame.

Shafts at the right frame assembly:
G-26, 1 grain of rice

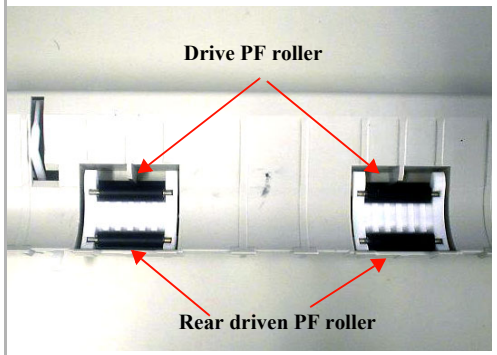
Figure 6-3. Shafts at the Right Frame Assembly



Lubricate G-26 at 2 places on inside of cam at slope surface of the release lever.

Release lever:
G-26, 1 grain of rice

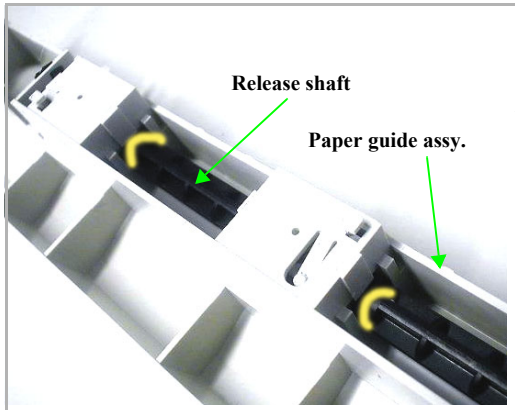
Figure 6-4. Release Lever



Lubricate G-26 to the shaft of the drive PF roller and the rear driven PF roller. (4 places)

PF roller assembly:
G-26, 1/2 grain of rice

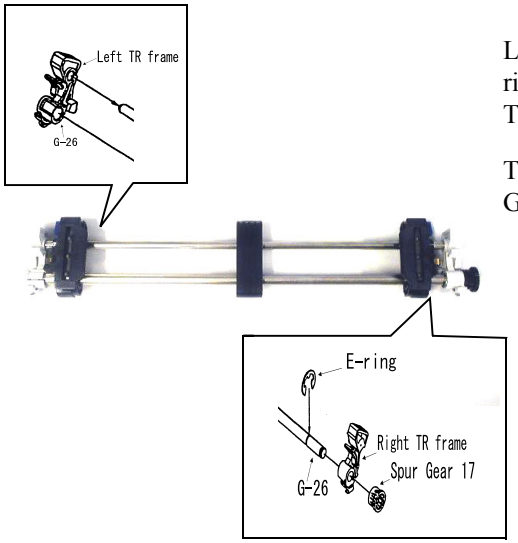
Figure 6-5. PF Roller Assembly



Set the paper guide assembly upside down and lubricate at the touching part of the PF roller assembly with the release shaft. (4 places)

Paper guide assembly:
G-26, 1 grain of rice

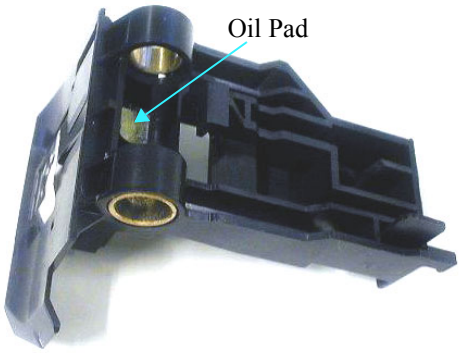
Figure 6-6. Paper Guide Assembly



Lubricate G-26 into the hole of the right TR (tractor) frame facing to the TR guide shaft and the left TR frame.

Tractor assembly:
G-26, 1/2 grain of rice

Figure 6-7. Tractor Assembly



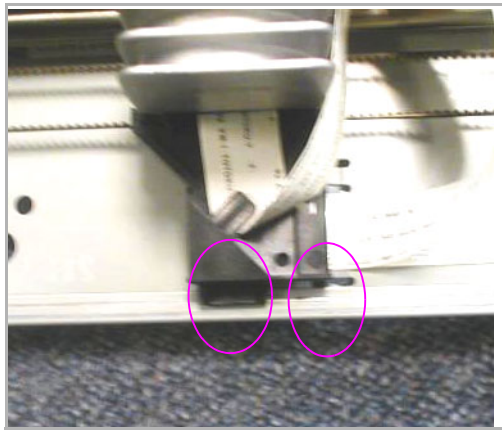
The picture at the left is the back of the printhead.

1. Set the oil dispenser 0.30ml.
2. Lubricate O-2 on the Oil pad.

Oil pad:
O-2, 0.28-0.32 cc

Note: Make sure that the setting of the oil dispenser is correct.

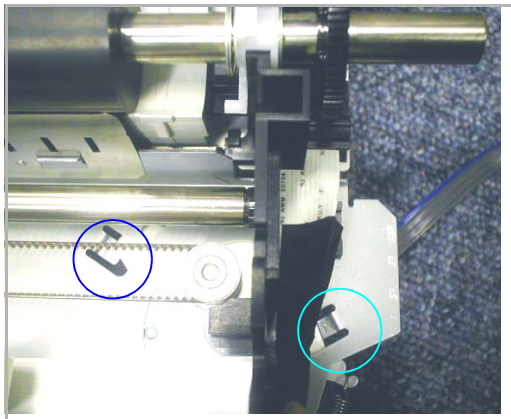
Figure 6-8. Oil Pad



Move the carriage around the center, then lubricate G-26 on the touching parts of the 2 sides of the frame.

Carriage:
G-26, 40mm x 2 places

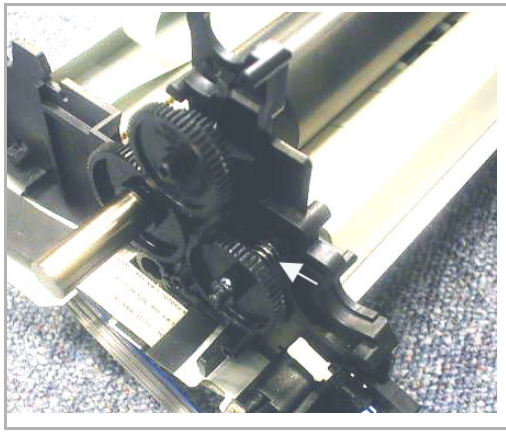
Figure 6-9. Carriage



Lubricate G-26 on the 2 touching position with CR motor assembly from the inside of the base frame.

CR motor assembly:
G-26, 1/2 grain of rice x 2

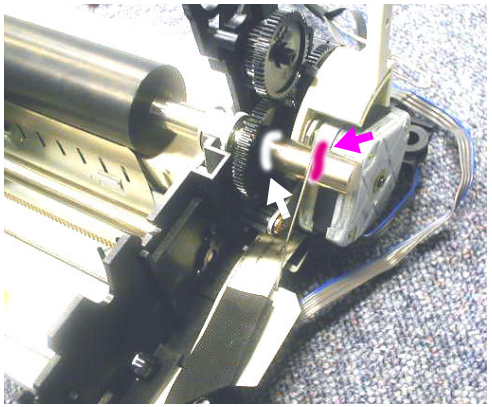
Figure 6-10. CR Motor Assembly



Lubricate G-26 on the installing shaft of the Combination Gear, 17.5, 27 of the right frame.

Combination gear 17.5, 27:
G-26, 1/2 grain of rice

Figure 6-11. Combination Gear 17.5, 27



Lubricate G-26 to the touching position of the platen grounding spring with Platen shaft and the spur gear 34.

Platen grounding spring:
G-26, 1 grain of rice.

Spur Gear:
G-26, 10mm

Figure 6-12. Platen Grounding Spring / Spur Gear

CHAPTER

7

APPENDIX

7.1 Connector Summary

The figure below illustrates how the primary components are connected.

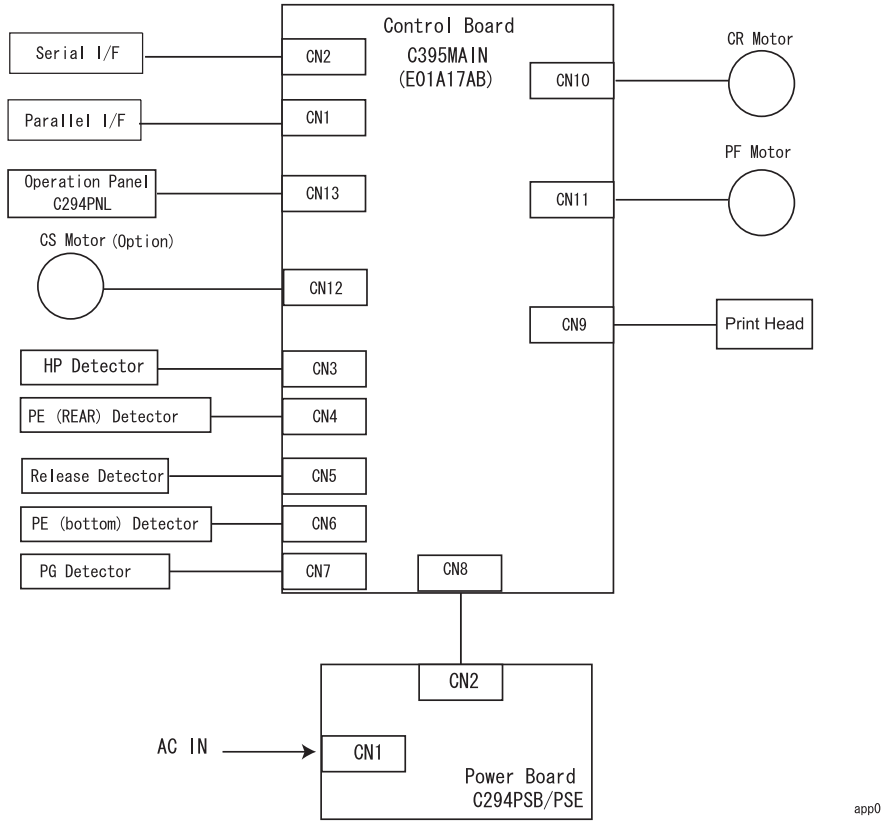


Figure 7-1. Cable Connections

Table 7-1. C395Main Connectors

Connector	Function	Pins
CN1	Parallel I/F	36
CN2	Serial I/F	6
CN3	HP Detector	2
CN4	PE (Rear) Sensor	2
CN5	Release Detector	2
CN6	PE (bottom) Detector	2
CN7	PG (Copy Mode) Detector	2
CN8	Power Board C294PSB/PSE	9
CN9	Printhead	12
CN10	CR Motor	4
CN11	PF Motor	4
CN12	CS Motor (Option)	10
CN13	Operation Panel C294PNL	12
CN16	Head	17

Table 7-2. CN3-HP Detector

Pin	I/O	Signal Name	Function
1	I	HP	Carriage home position sensor signal
2	-	GND	Signal ground

Table 7-3. CN4-PE (Rear) Sensor

Pin	I/O	Signal Name	Function
1	I	RPE	Rear paper end sensor signal
2	-	GND	Signal ground

Table 7-4. CN5-Release Sensor

Pin	I/O	Signal Name	Function
1	I	RELEASE	Release sensor signal
2	-	GND	Signal ground

Table 7-5. CN6-PE (Bottom) Sensor

Pin	I/O	Signal Name	Function
1	I	BPE	Bottom paper end sensor signal
2	-	GND	Signal ground

Table 7-6. CN7-PG (Copy Mode) Sensor

Pin	I/O	Signal Name	Function
1	I	PG	Paper gap (copy mode) sensor signal
2	-	GND	Signal ground

Table 7-7. CN8-Power Board C294 PSB/PSE

Pin	I/O	Signal Name	Function
1	-	VH	+35VDC
2	-	VH	+35VDC
3	-	GP	Signal ground
4	-	GP	Signal ground
5	O	PSC	Power save control
6	O	POFF	Power off signal
7	-	+5V	+5VDC
8	-	+5V	+5VDC
9	-	GND	Signal ground

Table 7-8. CN9-Head

Pin	I/O	Signal Name	Function
1	O	HD6	Head data 6
2	O	HD14	Head data 14
3	O	HD10	Head data 10
4	O	HD23	Head data 23
5	O	HD18	Head data 18
6	O	HD16	Head data 16
7	O	HD22	Head data 22
8	-	HDCOM	Common (VP)
9	-	HDCOM	Common (VP)
10	-	HDCOM	Common (VP)
11	O	HD7	Head data 7
12	O	HD19	Head data 19
13	O	HD 2	Head data 2
14	O	HD 11	Head data 11
15	O	HD 3	Head data 3

Table 7-9. CN10-CR Motor

Pin	I/O	Signal Name	Function
1	O	CRA	Carriage motor phase A
2	O	$\overline{\text{CRA}}$	Carriage motor phase $\overline{\text{A}}$
3	O	CRB	Carriage motor phase B
4	O	$\overline{\text{CRB}}$	Carriage motor phase $\overline{\text{B}}$

Table 7-10. CN11-PF Motor

Pin	I/O	Signal Name	Function
1	O	PFA	Paper feed motor phase A
2	O	PF$\overline{A}$	Paper feed motor phase $\overline{A}$
3	O	PFB	Paper feed motor phase B
4	O	PF$\overline{B}$	Paper feed motor phase $\overline{B}$

Table 7-11. CN12-CS Motor

Pin	I/O	Signal Name	Function
1	-	VH	+35VDC
2	-	CS/HOLD	+5VDC
3	-	+5V	+5VDC
4	O	CS$\overline{A}$	CS motor phase $\overline{A}$
5	O	CS$\overline{XA}$	CS motor phase $\overline{XA}$
6	O	CS$\overline{B}$	CS motor phase $\overline{B}$
7	O	CS$\overline{XB}$	CS motor phase $\overline{XB}$
8	-	GP	Signal ground
9	I	CSSW	Color ribbon sensor signal
10	-	GND	Signal ground

Table 7-12. CN13-Operation Panel C294PNL

Pin	I/O	Signal Name	Function
1	-	+5V	+5VDC
2	O	LED5	LED5
3	O	LED4	LED4
4	O	LED3	LED3
5	O	LED2	LED2

Table 7-12. CN13-Operation Panel C294PNL

Pin	I/O	Signal Name	Function
6	O	LED1	LED1
7	I	SW1	Switch 1
8	-	GND	Signal ground
9	-	GND	Signal ground
10	I	SW2	Switch 2
11	I	SW3	Switch 3
12	I	SW4	Switch 4

Table 7-13. CN16-Head

Pin	I/O	Signal Name	Function
1		TH1	Thermister1
2		TH2	Thermister2
3		HD4	Head data 4
4		HD20	Head data 20
5		HD8	Head data 8
6		HD12	Head data 12
7		HD16	Head data 16
8		HD24	Head data 24
9		HDCOM	Common (VP)
10		HDCOM	Common (VP)
11		HDCOM	Common (VP)
12		HD17	Head data 17
13		HD21	Head data 21
14		HD9	Head data 9

Table 7-13. CN16-Head

Pin	I/O	Signal Name	Function
15		HD13	Head data 13
16		HD1	Head data 1
17		HD5	Head data 5

7.2 Parts List

The following table shows parts name of this product. Refer to the exploded diagrams for parts' number.

Table 7-14. LQ-300+ Parts List

Code	Part Name
100	HOUSING ASSY, LOWER
103	HOUSING,UPPER
104	SHIELDPLATE,LOWER
105	COVER ASSY.,PRINTER
106	KNOB;W
109	SHEET GUIDE ASSY.
111	SHIELDPLATE,UPPER
115	COVER CONNECTOR,CS;W
116	HEXAGON NUT
117	GROUNDINGPLATE
118	GROUNDING PLATE,PANEL
119	EDGING;A
120	LOGO PLATE
123	FERRITE CORE,FPC-25-20
124	SHEET,PROTECT
125	CONNECTOR LOCK NUT
127	C.B.P-TITE,3X10,F/ZN
128	C.B.S. SCREW
129	C.B.B-TITE(P(13)),3X14,F/ZN
130	C.B.(O) SCREW 4X8 F/ZG

Table 7-14. LQ-300+ Parts List

Code	Part Name
131	C.P.SCREW
132	C.B.S. SCREW
180	GUIDE,STACKER
200	BOARD ASSY.,MAIN
450	BOARD ASSY.,PANEL
451	SHEET,PANEL
300	BOARD ASSY.,POWER SUPPLY
320	HARNESS
400	POWER CABLE,BS31303SI-BH
401	HARNESS
500	PRINTER MECHANISM(ASP),M-5V10-100
501	FRAME ASSY.,LEFT
502	FRAME,RIGHT
503	MOTOR ASSY.,CR
504	EXTENSION SPRING,8.10
505	LEVER ASSY.,PLANET
506	SHAFT,CR,GUIDE
507	LABEL,CAUTION BASE FRAME
508	COMBINATION GEAR,8.5,24
509	SPURGEAR,13.2
510	COMBINATIONGEAR,5.1,16.2
512	COVER,RD
513	RATCHET,RD
514	DETECTOR,LEAF,B1
515	GROUNDING WIRE,PLATEN

Table 7-14. LQ-300+ Parts List

Code	Part Name
516	PULLEY ASSY.,DRIVEN
517	HARNESS,HP
518	C.P.B SCREW
519	MOTOR ASSY.,PF
520	PAPER GUIDE
521	DETECTOR,PE,REAR
522	HARNESS,PE,REAR
523	DETECTOR,PE,BOTTOM
524	HARNESS,PE,BOTTOM
525	HOLDER,ROLLER,PF
526	ROLLER,PF,DRIVEN
527	ROLLER,PF,DRIVE,REAR;B
528	COMPRESSION SPRING,13.72
529	SHAFT,RELEASE
531	RETAINING RING
532	BUSHING,11
533	U-TYPE,11.2X0.13X16S/NA
534	PLAIN WASHER
535	PLATEN
536	CARRIAGE ASSEMBLY
538	OIL PAD
539	LEVER,G,ADJUST
540	RIBBON MASK
541	TIMING BELT
542	BUSHING,PARALLEL,ADJUST

Table 7-14. LQ-300+ Parts List

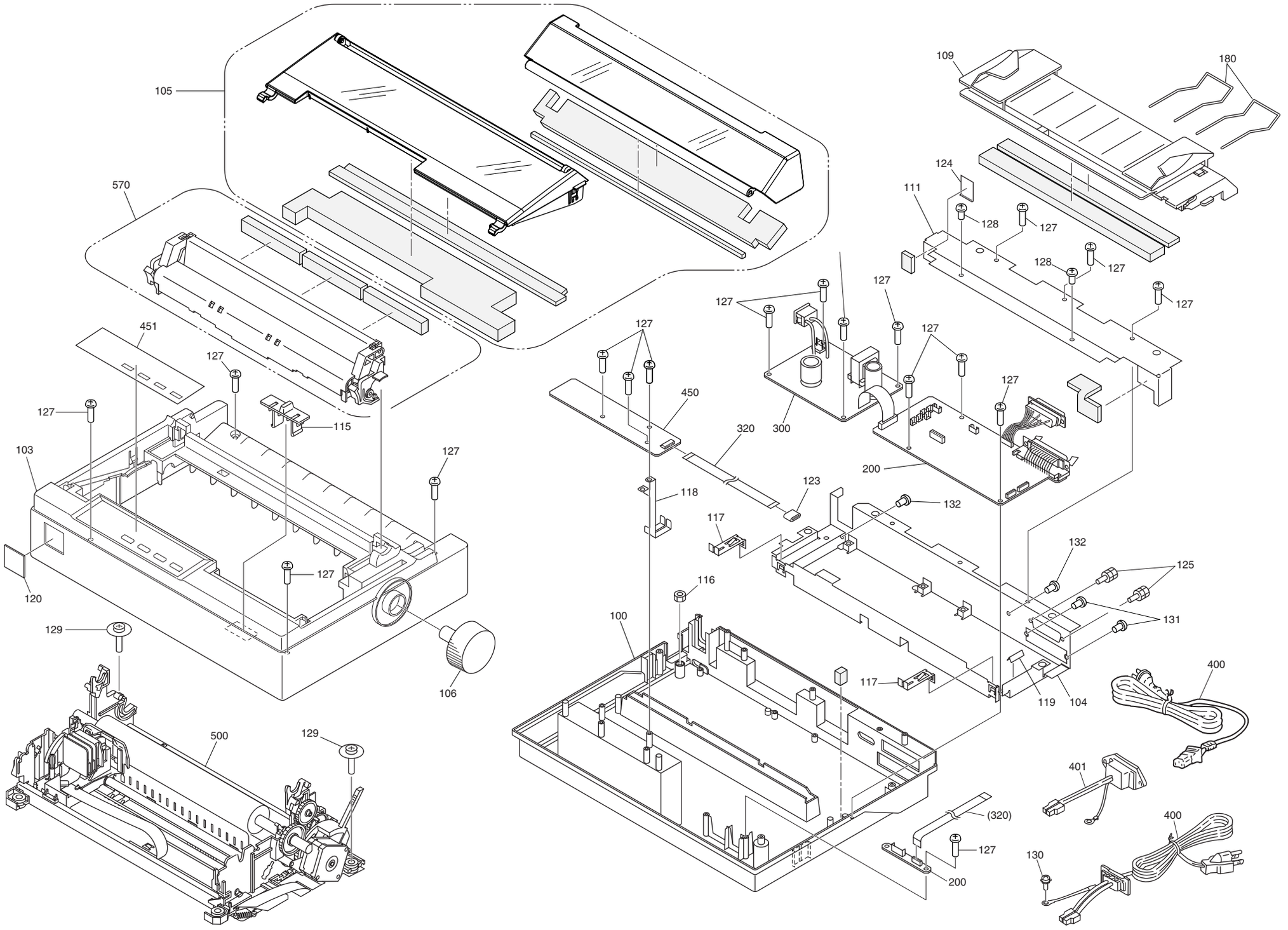
Code	Part Name
544	HARNESS,PG
545	PAPER GUIDE,LOWER
546	CABLE,HEAD,FRONT
547	CABLE,HEAD,REAR
559	DAMPER
560	FRAME,BASE
561	PAPER GUIDE,SUPPORT
562	GROUNDING PALTE,SHAFT,CR
563	SHEET,CABLE,HEAD
564	GEAR,34
565	SPUR GEAR,27.5
566	PLAIN WASHER
567	COMPRESSION SPRING,1.18
569	HARNESS,RELEASE
570	PAPER EJECT ASSY.
571	COMBINATION GEAR,17.5,27
573	GROUNDING PLATE,CS
575	GROUNDING WIRE,RIGHT
576	GROUNDING PLATE,PF
577	SHEET,PROTECT,CABLE
578	SHEET,PROTECT,M/B
579	LEAF SPRING,8.6X0.13X15,S/NA
580	C.B.P-TITE,3X10,F/ZN
581	C.B.S. SCREW
582	P.W.,8.4X0.1X15,S/NA

Table 7-14. LQ-300+ Parts List

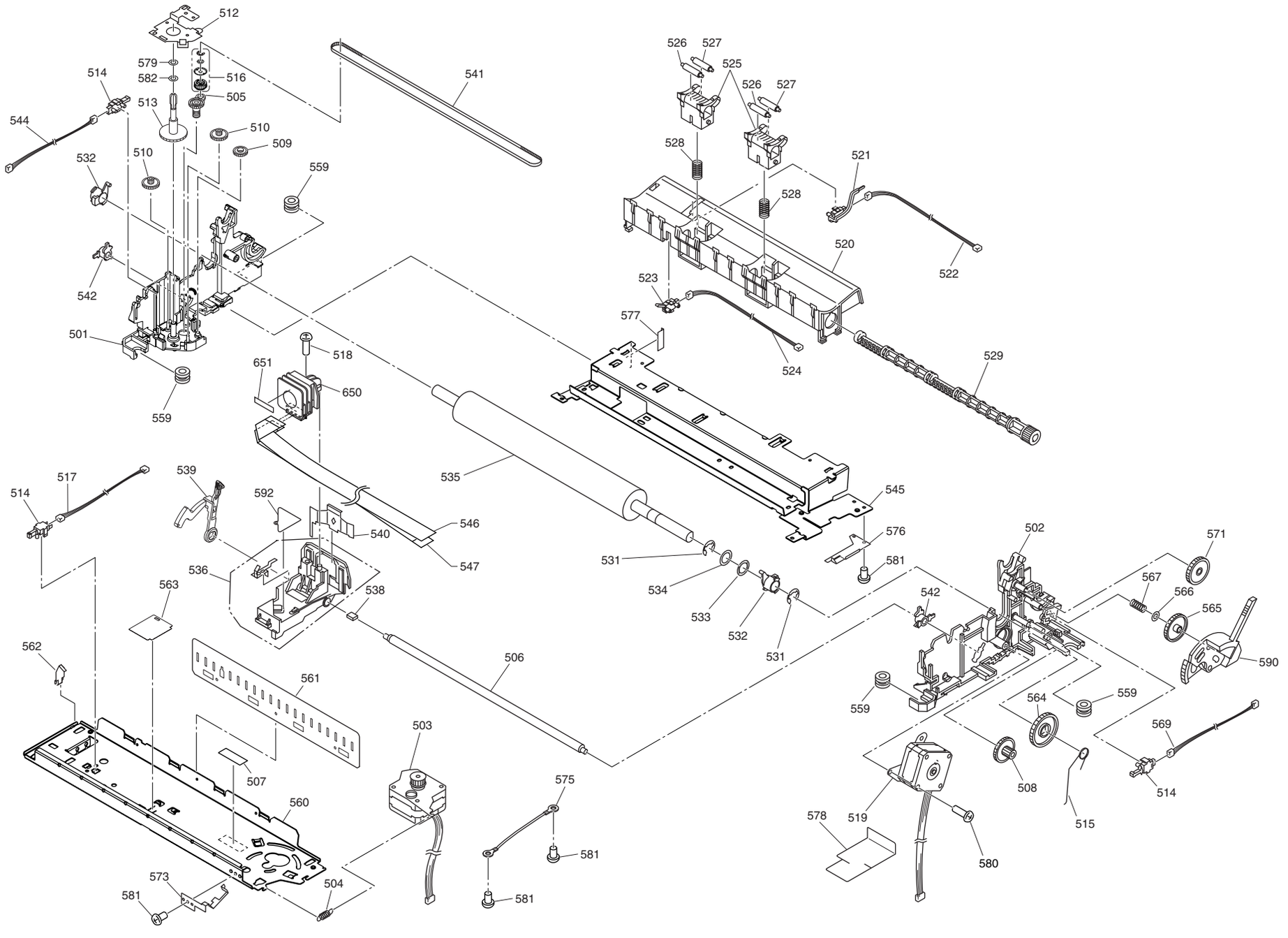
Code	Part Name
590	LEVER,RELEASE
592	SHEET,CABLE,CR
650	PRINTHEAD,DH24-0U0
651	LABEL,WARNING

7.3 Exploded Diagrams

Exploded diagrams of LQ-300+ are shown on the following pages.



LQ-300+ No.01 Rev.01 10302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504

7.4 Component Layout

This section provides component layouts.

C395MAIN BOARD -MOUNTED SIDE

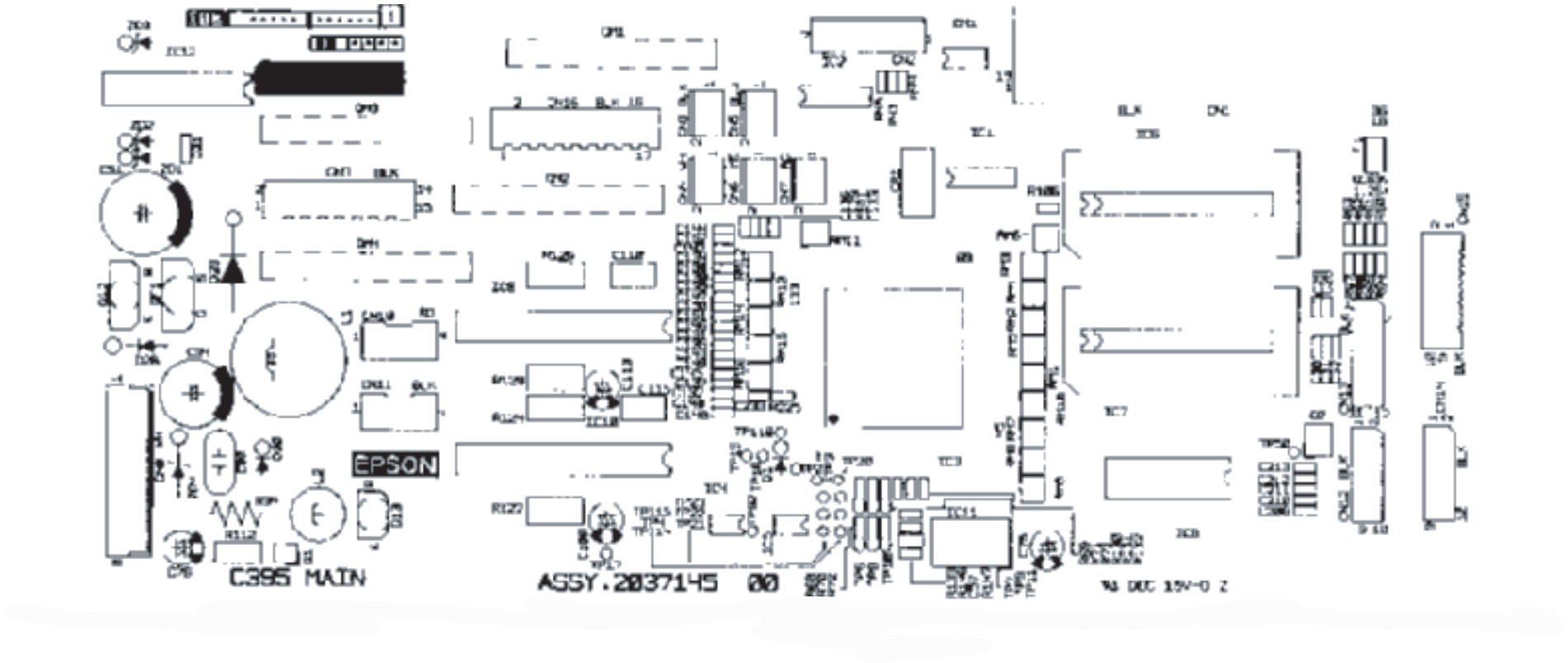


Figure 7-2. Component Layout-C395MAIN (Mounted Side)

C395MAIN BOARD-SOLDERED SIDE

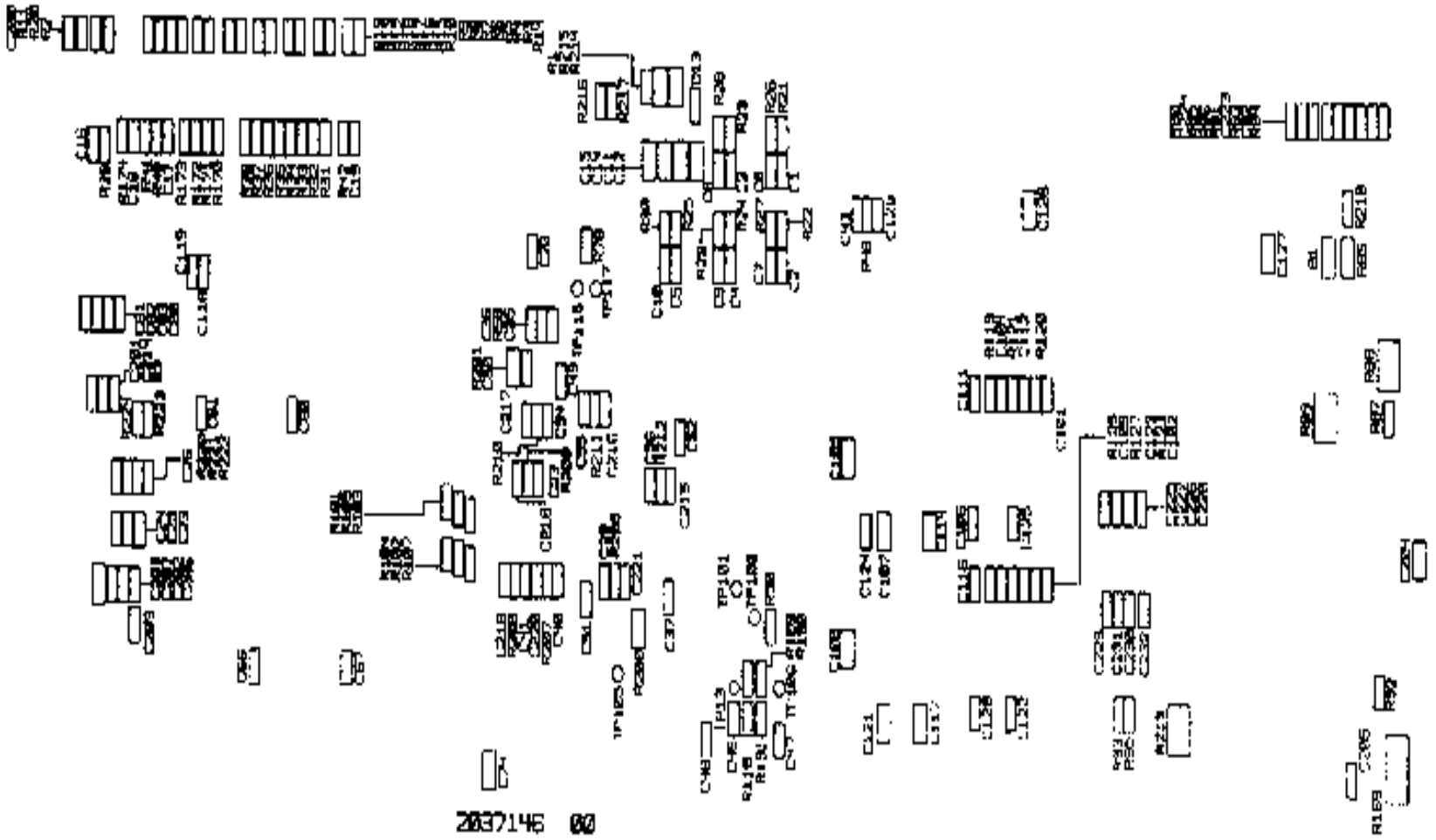


Figure 7-3. Component Layout-C395MAIN (Soldered Side)

C294PSB BOARD

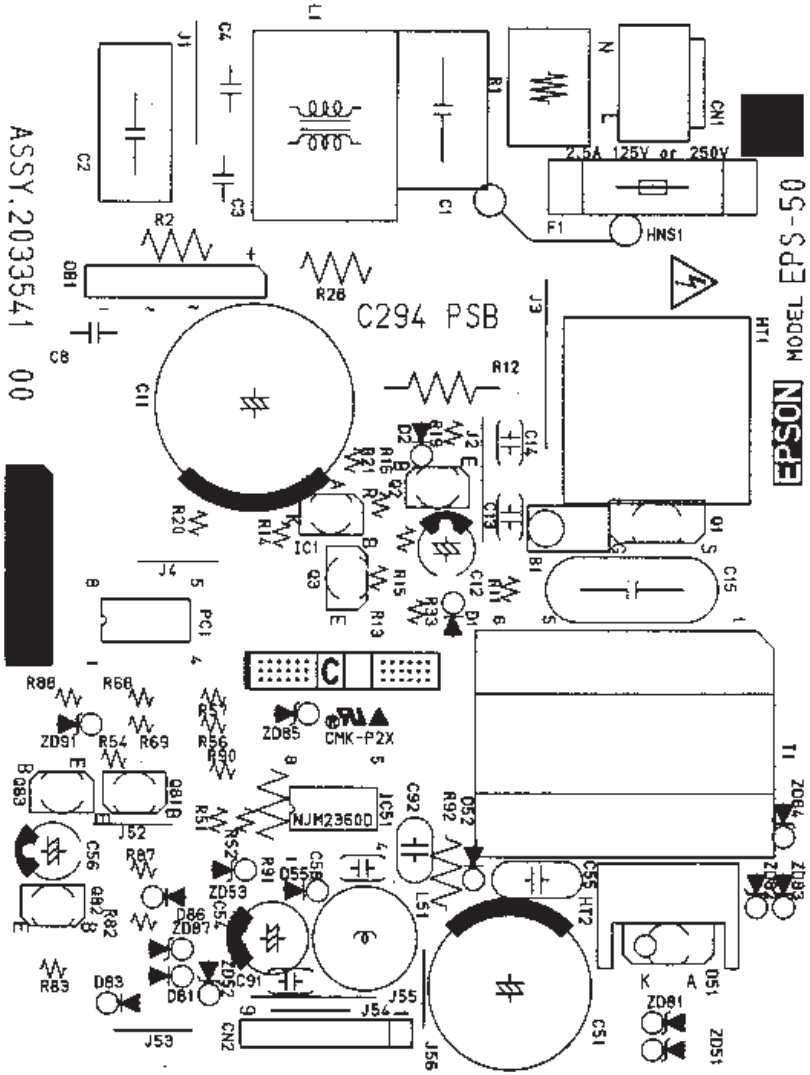


Figure 7-4. Component Layout-C294PSB

C294PSE BOARD

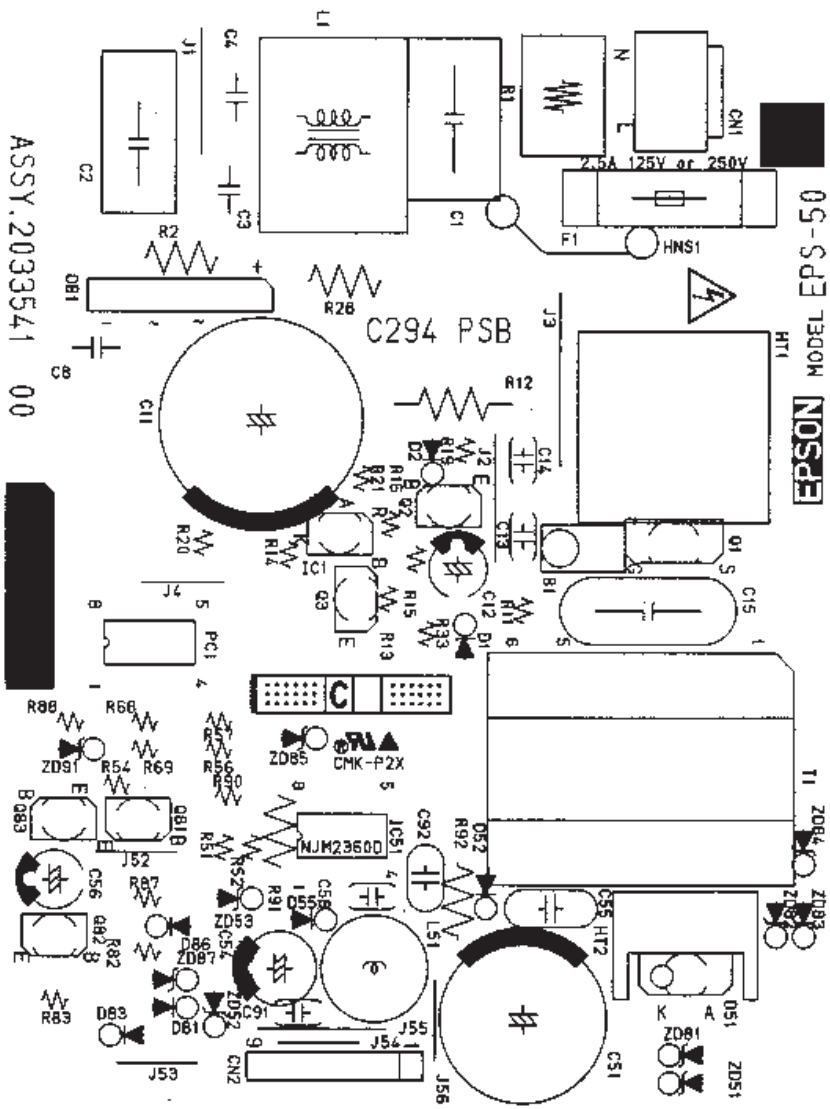


Figure 7-5. Component Layout-C294PSE

C294PNL BOARD

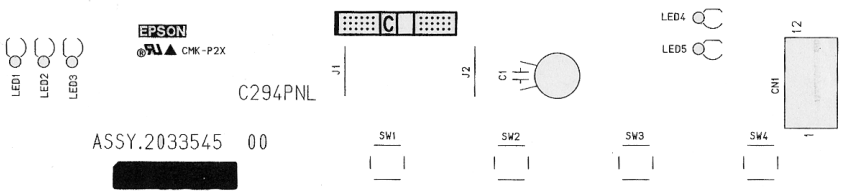
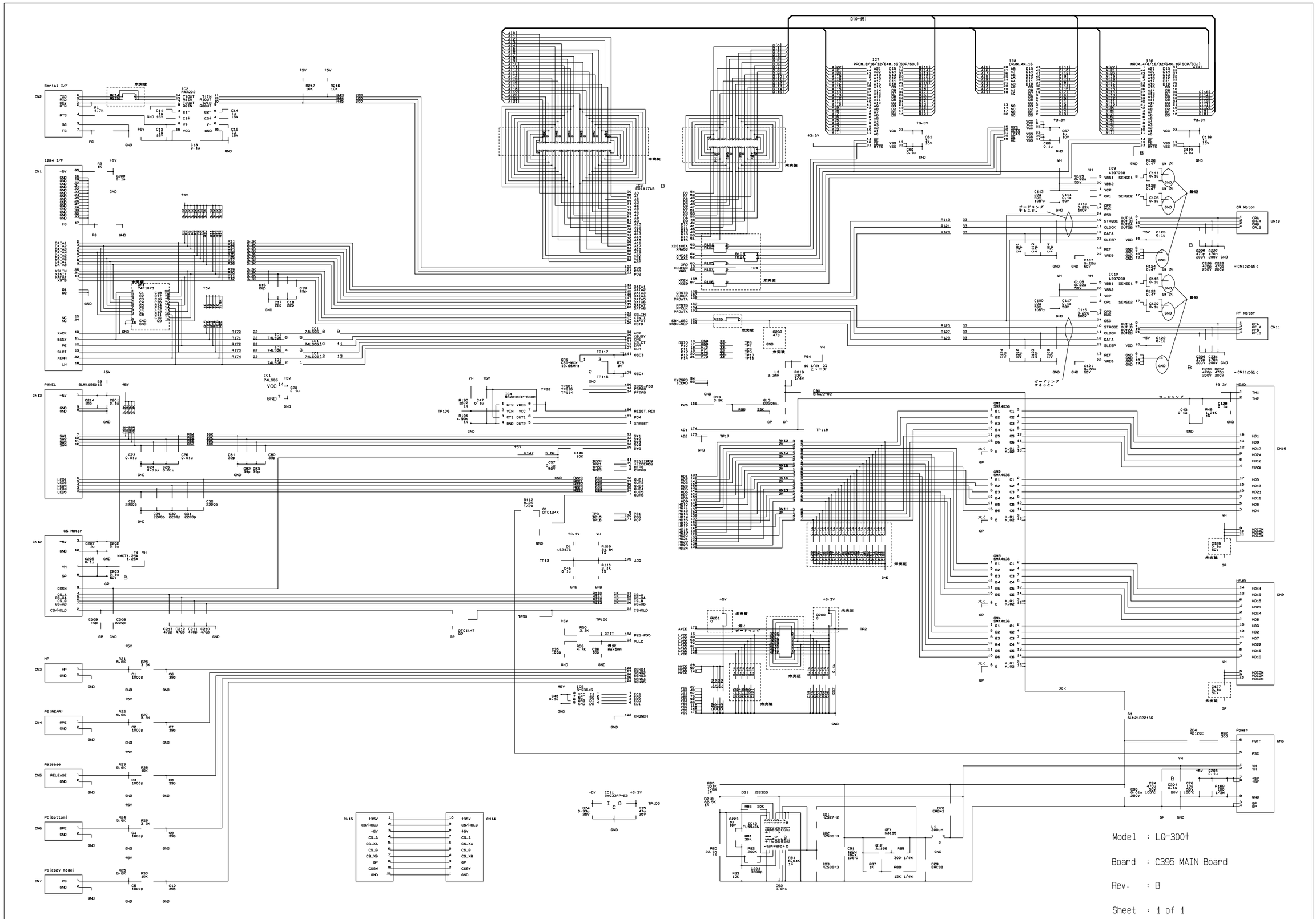


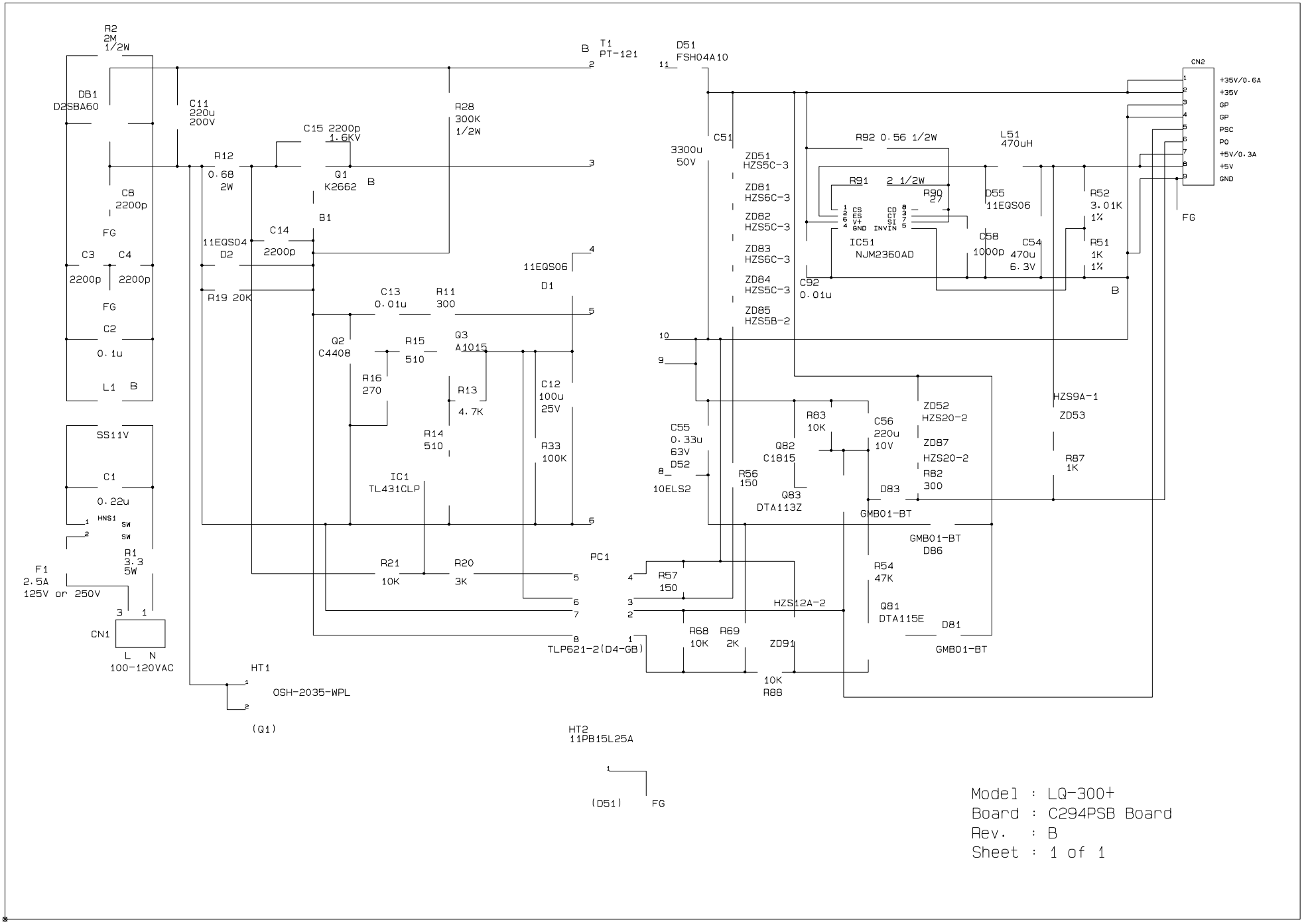
Figure 7-6. Component Layout-C294PNL

7.5 Electric Circuit Schematics

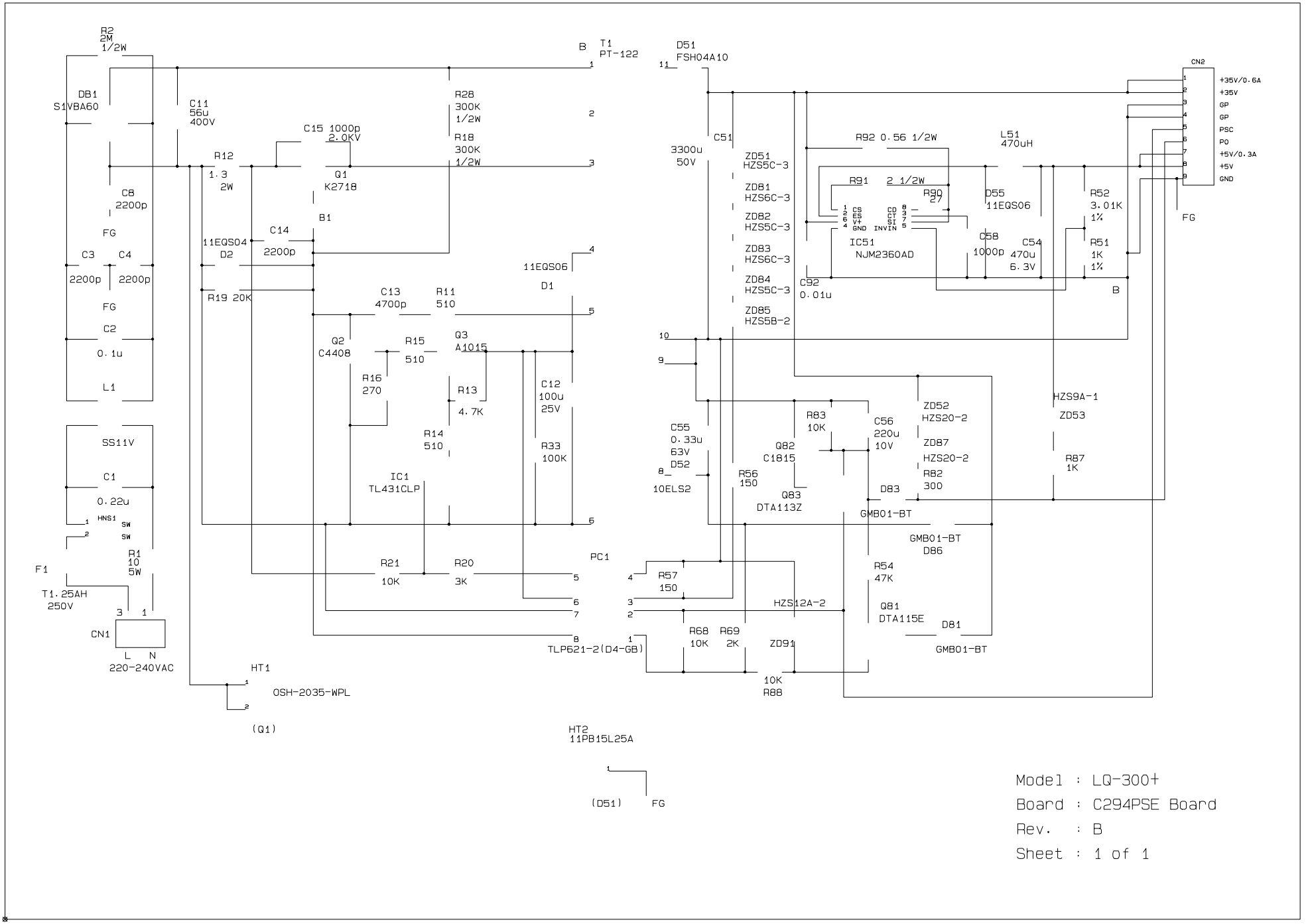
The following pages show circuit schematics below.

- C395MAIN Board
- C294PSB Board
- C294PSE Board
- C294PNL Board

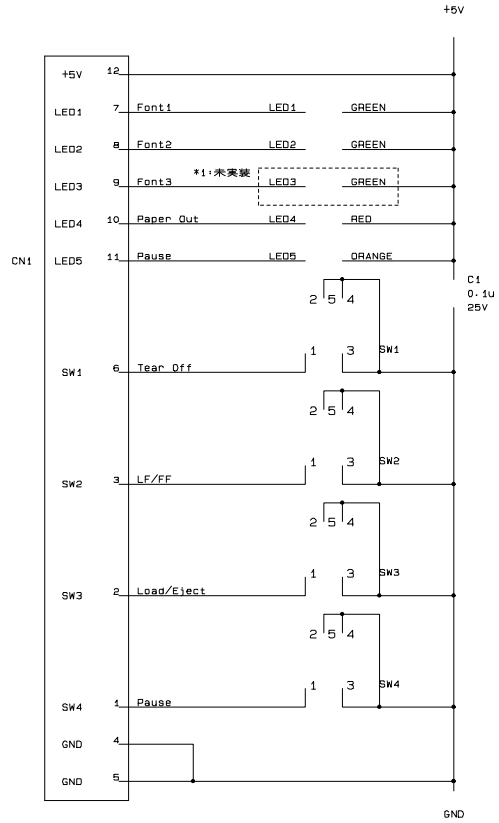

Serial I/F
1284 I/F
PANEL
HP
PE(REAR)
Release
PE(bottom)
PG(copy mode)
C5 Motor
CR Motor
PF Motor
CN1
CN2
CN4
CN5
CN6
CN7
CN9
CN10
CN11
CN12
CN13
CN14
CN15
CN16
IC1
IC2 MAX202
IC3 E01A17AB
IC4 MSD030FP-600C
IC5 S-93C46
IC6 74HC1071
IC7 PROM...8/16/32/64M..16(SOP/SOJ)
IC8 DRAM..4M..16
IC9 A3972SB
IC10 A3972SB
IC11 BA033FP-E2
D[0-15]
A[0-21]
Model : LQ-300+
Board : C395 MAIN Board
Rev. : B
Sheet : 1 of 1



Model : LQ-300+
Board : C294PSB Board
Rev. : B
Sheet : 1 of 1



Model : LQ-300+
Board : C294PSE Board
Rev. : B
Sheet : 1 of 1



Model : LQ-300+
Board : C294PNL Board
Rev. : A
Sheet : 1 of 1